2

# SEL-Teleprinter LO 2000

Service Instructions

01899 40040/2 E
1.78 PFS/TEP 0.001...1000
Business Systems Group
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Standard Elektrik Lorenz AG Germany

1. GENERAL

2. FAULT CLEARING

3. REPAIR

4. STRAP MODIFICATIONS AND
MEASURING POINTS

5. ERSATZTEILVERZEICHNIS
PARTS LIST
LISTE DES PIECES DETACHEES
LISTA DE PIEZAS

# 1. GENERAL

CONTENTS Page


1.1. General Informations ..... 1 — 3

1.2. Technical Data ..... 1 — 3

1.3. Hints for the Handling of PC Boards in MOS Technology ..... 1 — 5

1.4. Type Designation Key to Teleprinter Versions ..... 1 — 6

1.5. Some Important, Manipulations ..... 1 — 6

1.6. Connections in the Telecommunication Plug and in the Telecommunication Socket ..... 1 — 8

1.7. International Telegraph Alphabet No. 2 .. 1 — 10

## 1.1. General Informations

The SEL-Teleprinter LO 2000 is designed on the subassembly unit basis and is therefore easy to maintain. Repairs are made by the replacement of the faulty functional subassemblies. This replacement covers both the mechanical and the electronic subassembly units. Thanks to the adoption of the principle of subassembly unit replacement the downtimes of the equipment in the event of a defect are kept short.

The service instructions are intended to serve the trained technican as a guide and reference aid in the servicing of the SEL-Teleprinter LO 2000. Its conception is completely in line with the principle of subassembly unit replacement. The fault tracing program of the chapter "Fault Clearing" aids to locate the defective subassembly quickly. The chapter "Repair" is limited to those functional subassemblies and parts which can be exchanged with little expenditure of time and by the use of simple tools. The interface adjustments involved in the above operations are likewise contained in the chapter "Repair".

The chapter "Strap Modifications and Measuring Points" includes the drawings of the printed circuit boards in ascending sequence of the PC boards (LP). The drawings show the position of the straps and measuring points in addition to the piece parts of the subassembly. The straps and the measuring points of a PC board are described in a succeeding text at which moreover the coordination of a certain arrangement of straps to a subject number (order number) is considered.

The chapter "Parts List" contains the order numbers(≙ part numbers) of the most important functional subassemblies.

## 1.2. Technical Data

| | |
|---|---|
| Mode of operation | Start-stop system |
| Code | International Telegraph Alphabet No. 2 |
| Telegraph voltage | Adaptable to all interface requirements by means of different line adaptations |
| Telegraph current | |
| Signaling speed | 50, 75 and 100 bauds, selectable,<br>special versions for rates between 45.5 and 100 bauds |
| Printing rate | |
| at 50 bauds with 1.5-unit stop element | Max. 6.66 characters per second = 400 characters per minute |
| at 50 bauds with 1-unit stop element | Max. 7.14 characters per second = 428 characters per minute |
| at 75 bauds with 1.5-unit stop element | Max. 10 characters per second = 600 characters per minute |
| at 75 bauds with 1-unit stop element | Max. 10.7 characters per second = 643 characters per minute |
| at 100 bauds with 1.5-unit stop element | Max. 13.3 characters per second = 800 characters per minute |
| | Characters buffered in the receiver store are printed out at a rate of 16 characters per second |
| Length of stop element | |
| Transmitter end | For all modulation rates: 1.5 or 2 units, selectable |
| Receiver end | Up to 75 bauds, shortest stop element = 1 unit |
| | Above 75 bauds, shortest stop element = 1.5 units |
| Signal input and output | Serial information transfer |
| Transmission distortion | $\leq \pm 2\%$ |
| Receiving margin | $\geq \pm 48\%$ |
| Transmitter storage capacity | 20 characters |
| Receiver storage capacity | 16 characters |
| Power supply | |
| Mains voltage | 110, 115, 127, 150, 220, 240 V resp. 115, 150, 220, 240 +10 % to —15 %, selectable |
| Mains frequency | 47 to 52 Hz or 57 to 63 Hz |
| Power consumption | 120 VA, approx. |
| Motor | Asynchronous motor 110 V, 50 Hz, 2750 rpm or<br>110 V, 60 Hz, 3300 rpm |

| | |
|---|---|
| Keyboard | Full width four-row keyboard with storage and automatic letters/figures shift<br>Narrow four-row keyboard with storage<br>Narrow three-row keyboard with storage<br>Special layouts with storage |
| Number of keys | Max. 63 coding keys |
| Key travel | 4 mm, approx. |
| Paper guide | Friction or sprocket wheel drive 209 to 217 mm, adjustable |
| Line spacing | Single line spacing to 4.23 mm ($^1/_6$ in.)<br>1.5 line spacing to 6.35 mm ($^1/_4$ in.)<br>2 line spacing to 8.46 mm ($^1/_3$ in.) |
| Line length | 69 or 72 characters/line, adjustable, resp. 104 characters/line |
| Character spacing | Spacing 2.54 mm ($^1/_{10}$ in.); with 104 characters/line: spacing 1.65 mm ($\approx$ $^1/_{15}$ in.) |
| Printing | 4 copies max. |
| Color ribbon | Endless-ribbon cartridge, 13 mm ribbon, 12 m length |
| Answer-back unit | 20 freely selectable characters max. |
| Supplementary equipment | Tape punch<br>Tape reader |
| Locking devices | Keyboard will be locked electrically<br>— when tape reader is switched on<br>— when answer-back unit is operating<br>— when storage is full<br>— at end of line<br>— simultaneous double operation of keys (option)<br>End-of-paper contact<br>Cover contact (option) |
| Signaling devices | Audible end-of-line warning (initiated 10 characters before end of line)<br>Audible warning, when transmitter storage capacity (20 characters) has been reached<br>Visual indication when keyboard is locked electrically<br>Visual indication with simultaneous double operation of keys<br>Line monitoring (option) |
| Temperature range | |
| Operation | 0°C to +45°C ambient temperature |
| Storage | —40°C to +70°C ambient temperature |
| Relative humidity | 35 to 85% |
| Permissible incline | 15° max. in any direction during operation |

**Tape Punch**

| | |
|---|---|
| Punching speed | Depending on printing rate, up to 16 characters per second |
| Functional keys | On, Off, Permanently On, Tape Backspace,<br>Tape Run Out with punching of Ltrs (resp. combination 32 in options) |

| | |
|---|---|
| Automatic switching | With changes in the operation mode the tape punch is automatically switched off unless the key "Permanently On" is depressed. If the operation mode is changed and the key "Permanently On" is pressed, the "Ltrs" combination resp. the combination 32 (option) is automatically punched four times to separate the information on the tape |

**Tape Reader**

| | |
|---|---|
| Signal output | Parallel; conversion to serial by transmitter electronics |
| Reading speed | Depending on selected teleprinter speed, max. 13.3 characters per second |
| Functional keys | On, Off, Step, Skip |
| Automatic switching | In case of end-of-tape, incoming message, change of operation mode, and exceeding tape pull (option) the tape reader is switched off automatically |

**Dimensions and Weights**

| | Height mm | Width mm | Depth mm | Weight kg |
|---|---|---|---|---|
| LO 2000 with tape punch and tape reader, desk model | 296 | 525 | 605 | 30 |
| LO 2000 with tape punch and tape reader, upon console | 946 | 525 | 605 | 39 |
| LO 2000 with tape punch, receiver-only, desk model | 296 | 525 | 428 | 26 |

## 1.3. Hints for the Handling of PC Boards in MOS Technology

MOS integrated circuits are particulary exposed to the risks of electrostatic charges. Static charges not only occur in plastic table plates, floor coverings, railings, paper etc. but also on the repairman. At low air humidities in overheated rooms, persons may charge up to several thousands of volts, with rubber and plastic soles or clothes made of synthetic fibres aiding the charging process. All MOS integrated circuits contain an integrated diode network which protects the inputs against electrostatic charges. The efficiency of this protective circuit, however, is limited in the case of low contact resistance, for instance when touching with moist hands.

Therefore it is recommended to observe the following points when handling PC boards in MOS technology:

1. Prior to the removal of PC boards from the equipment or from the antistatic packing it is absolutely necessary that the person handling the equipment produces an equalization of potential by touching the frame of the SEL-Teleprinter LO 2000.
2. PC boards must be packed antistatically.
3. In spite of the precautions mentioned in (1) touching of PC tracks or components must be avoided.
4. After removal of PC boards from the equipment, they must be placed upon an antistatic pad.
5. Defective PC boards must be returned in packings identified by the word "Defect".

**When exchanging**

— a mechanical functional unit or

— a PC board,

**it is absolutely necessary to pull the mains plug and the line current plug before proceeding to dismantle.**

Non-observance of these points may involve the following riks:

— incoming teleprinter signals may start the teleprinter while the defective unit is being replaced

— PC boards may be damaged (MOS technology).

Only when all plug-in units have been correctly inserted, the mains plug and the line current plug are allowed to be reinserted.

With mains plug and/or line current plug pulled, the connecting lead may be selected by the calling subscriber, because however the called connecting lead remains in a high-resistance condition no polarity change takes place from the selecting condition into the printing condition (B-signaling). The calling subscriber releases himself by depressing the clear key. In other signaling systems (e.g. A-signaling) the calling subscriber is told by means of determined telegraph characters that no interchange of informations with the called subscriber is possible.

## 1.4. Type Designation Key to Teleprinter Versions

The ten-digits type designation (order number), which is engraved in the equipment label, provides information in the 9th and 10th digit about additional facilities of the teleprinter.

| Code number 9th and 10th digit | Additional facilities | | | | | |
|---|---|---|---|---|---|---|
| | Tape punch (ELO) | Tape reader (LS) | Subscriber unit (FSE) | Motor switch (MS) | Answer-back unit 1 (KG 1) | Answer-back unit 2 (KG 2) |
| 01 | | | | | × | |
| 02 | × | | | | × | |
| 03 | × | × | | | × | |
| 04 | × | × | | × | × | |
| 05 | × | × | × | | × | |
| 06 | × | × | × | × | × | |
| 07 | × | | | × | × | |
| 08 | × | | × | × | × | |
| 09 | × | | × | | × | |
| 11 | | | | | × | × |
| 12 | × | | | | × | × |
| 13 | × | × | | | × | × |
| 14 | × | × | | × | × | × |
| 15 | × | × | × | | × | × |
| 16 | × | × | × | × | × | × |
| 17 | × | | | × | × | × |
| 18 | × | | × | × | × | × |
| 19 | × | | × | | × | × |
| 23 | | × | | | × | |
| 24 | | × | | × | × | |
| 25 | | × | × | | × | |
| 26 | | × | × | × | × | |
| 27 | | | | × | × | |
| 28 | | | × | × | × | |
| 29 | | | × | | × | |
| 33 | | × | | | × | × |
| 34 | | × | | × | × | × |
| 35 | | × | × | | × | × |
| 36 | | × | × | × | × | × |
| 37 | | | | × | × | × |
| 38 | | | × | × | × | × |
| 39 | | | × | | × | × |
| 41 | | | | | | |
| 42 | × | | | | | |
| 43 | × | × | | | | |
| 44 | × | × | | × | | |
| 45 | × | × | × | | | |
| 46 | × | × | × | × | | |
| 47 | × | | | × | | |
| 48 | × | | × | × | | |
| 49 | × | | × | | | |
| 63 | | × | | | | |
| 64 | | × | | × | | |
| 65 | | × | × | | | |
| 66 | | × | × | × | | |
| 67 | | | | × | | |
| 68 | | | × | × | | |
| 69 | | | × | | | |

## 1.5. Some Important Manipulations

### Opening and Closing the Cover

Turn the cover up to the stop. The cover is held in this position by itself. Closing of the cover is analogously in the reverse order after overcoming a small resistance of the stop.

### Line Spacing Selection

- — Pull the mains plug, open the cover
- — Pull the line selector lever on the left-hand side of the platen towards you
- — Bring the line selector rod into the desired position. The three possible positions — single, 1.5-fold and 2-fold line spacing — are marked by engravings
- — Move the line selector lever back as far as to the stop
- — Close the cover and reinsert the mains plug.

### Loading the Paper Roll

Use paper rolls for teleprinters marked with "DIN 6720".

- — Pull the mains plug, open the cover
- — Depress the locking pawl on the left-hand side of the platen and by turning the platen knob feed out the paper of the old paper roll to the rear
- — Press the two catches of the paper roll spindle towards the outside and lift out the spindle with the remaining paper
- — Remove the remaining paper from the spindle
- — Slide the new paper roll on the spindle in such a manner that the beginning of the paper hangs down at the rear and the roll is locked in position by the holding spring
- — In this position press the paper roll into two fixtures
- — Feed the free end of the paper over the spring born shaft and between the rigid shaft and the spring plate to the platen
- — Lift off the feed roller shaft by actuating the bail with the red handle (at the left above the platen). Turn the platen knob until the paper arrives at the lower edge of the tear-off blade
- — By lowering the feed roller shaft press the paper against the platen. Turn the platen knob until the paper is above the upper edge of the tear-off blade
- — After shifting the release lever (at the right side of the platen) align the paper
- — Tear off the paper at the tear-off blade and close the cover
- — Reinsert the mains plug.

### Replacing the Color Ribbon Cartridge

- — Pull the mains plug; open the cover
- — Pull the red knob at the right-hand side of the cartridge support towards the outside
- — The color ribbon cartridge is lifted at the right side. Take the cartridge out of the left support

— Place a new cartridge into the support and press down until it engages

— Close the cover and reinsert the mains plug.

**Fitting a New Tape Roll**

Use tape rolls marked "DIN 6720".

— Pull the mains plug, open the cover

— Tear off the tape at the roll and pull out the torn-off tape towards the front from the tape punch

— Lift the tape reel with the bearing bracket and take off the old roll

— Insert the new roll in such a manner that it unwinds from the bottom to the top in the direction towards the spring plate

— Tear off the tape at the tear-off knife

— Pull the pressure roller release lever and feed the tape below the spring plate, the rollers, and the tear-off knife

— Close the cover and reinsert the mains plug

— Switch on the teleprinter to local operation and depress the tape Run Out key until the tape is punched properly

— Switch off the teleprinter and empty the cuttings box.

**Coding of the Answer-back Unit**

40 characters can be coded by holes in a radial arrangement into seven coaxial tracks. Tracks 1 to 5 represent the character in the 5-bit code, the disk being pierced at the points prepared to obtain the corresponding holes. A hole will represent a signal element; no hole means no signal element.

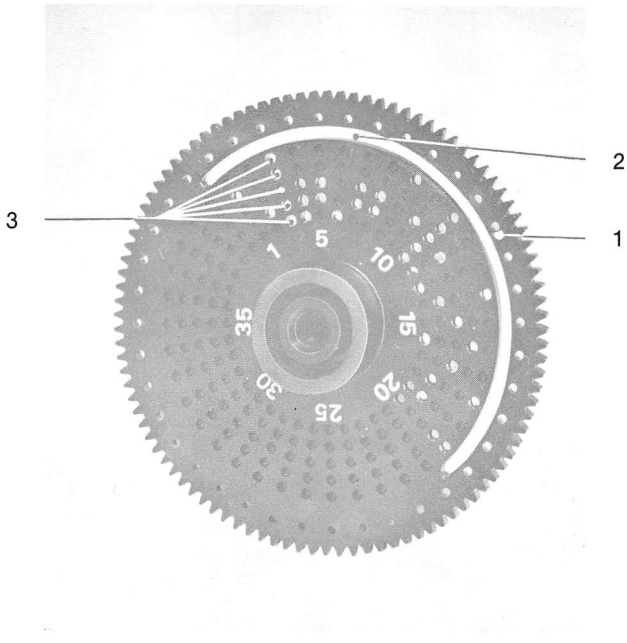



Fig. 3 Answer-back Unit Disk

1 Clock track
2 Separating track
3 Track 1...5

Track 6 has been constructed as through-slot covering half the perimeter; thus, it offers the possibility to separate the first 20 characters from the remaining 20 ones.

The first 20 characters must represent the answer-back (identification) combinations laid down by the respective National Post Authority. The remaining 20 characters can be transmitted automatically only in special networks; at any rate an additional electronic control in the teleprinter is necessary.

Track 7 produces the scanning clock for the code perforations.

The regulations in the normal case require the combinations according to the International Telegraph Alphabet No. 2.

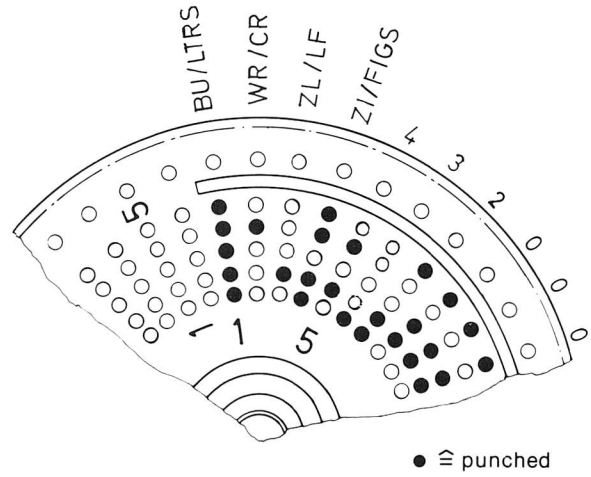
Hereafter as example the required combinations in the German Telex System:

| Punching track 1 to 5 | Combination or text |
|---|---|
| 1 | 29th combination (Ltrs) |
| 2 | 27th combination (CR) |
| 3 | 28th combination (LF) |
| 4 | 30th combination (Figs) |
| 5 to 19 | calling number<br>abbreviate name<br>nationality characteristics |
| 20 | 29th combination (Ltrs) |

Except in case of the combinations 27 to 32 (CR, LF, Ltrs, Figs, Space, and 32nd) the corresponding shift combination (Ltrs or Figs) must be preceded prior to each changing of the shift position (letters position to figures position and reverse).

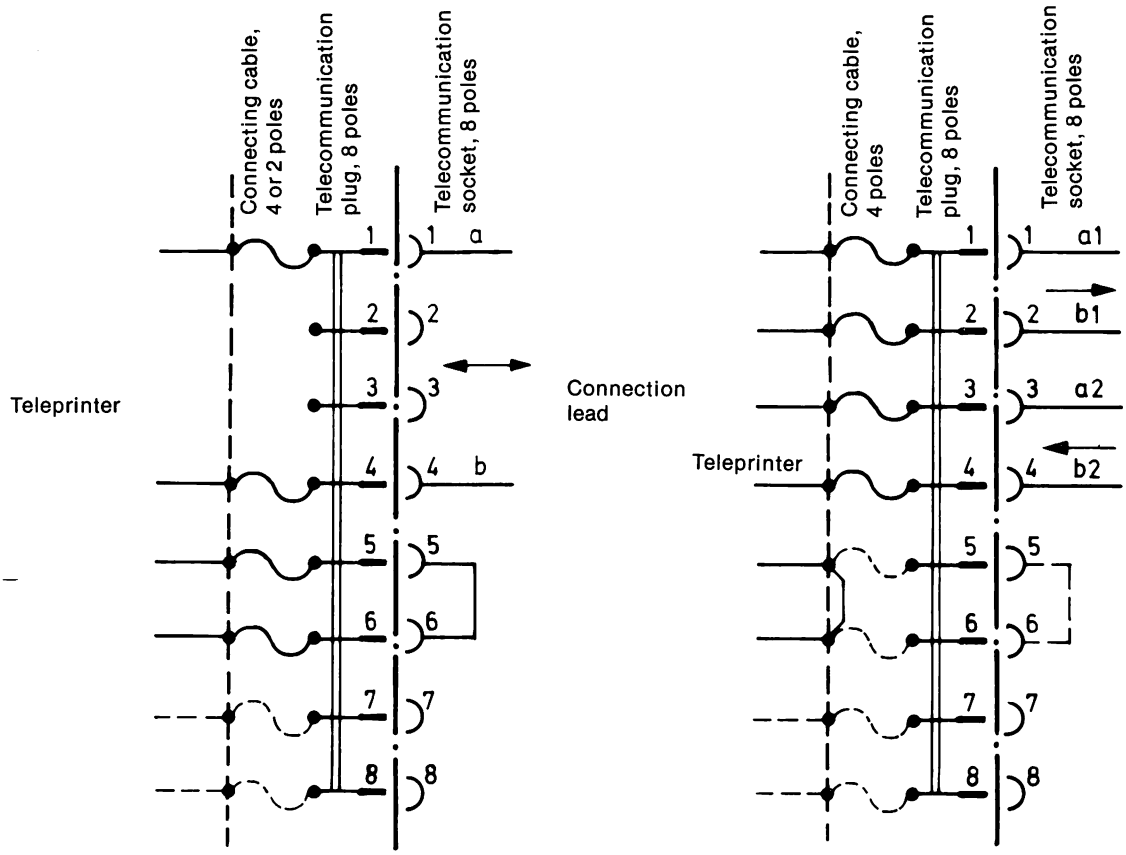
In the following example the number "43200" is coded. The character combinations can be learnt from the international Telegraph Alphabet No. 2 (paragraph 1.7.).

Example:




● ≙ punched

## 1.6. Connections in the Telecommunication Plug and in the Telecommunication Socket

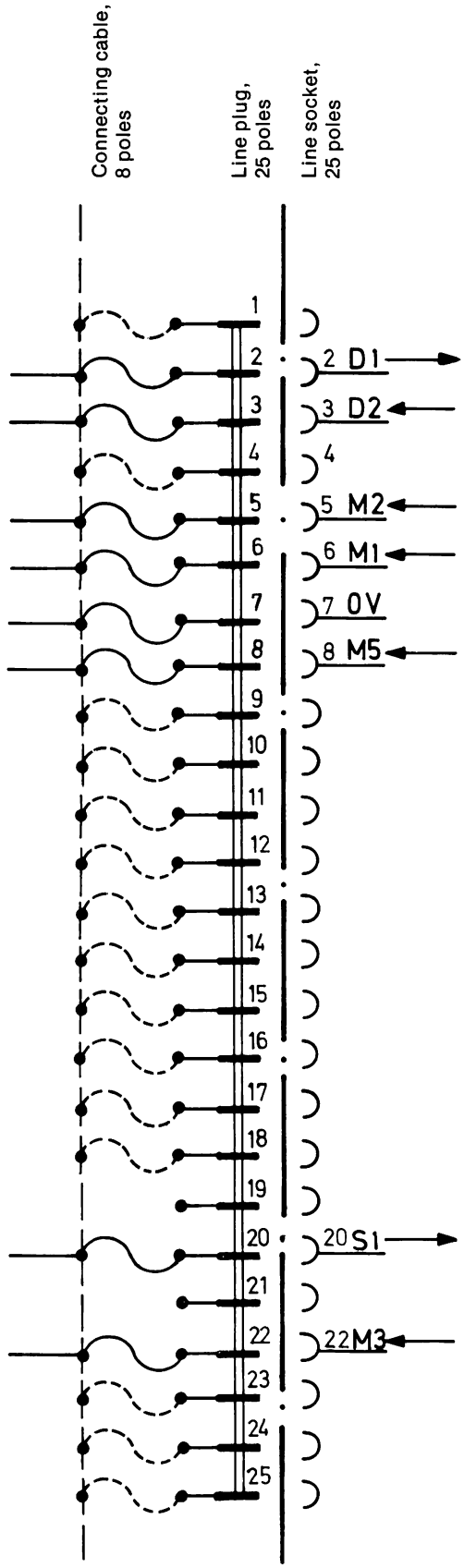



| St/Bu Pin | Two-Wire Applications | Four-Wire Applications |
|---|---|---|
| 1 | transmit / receive data | transmit data |
| 2 | idle | transmit data |
| 3 | idle | receive data |
| 4 | transmit / receive data | receive data |
| 5 | 0-V loop[1]) for connector monitoring. This strap must not be inserted if the electronics of the teleprinter are designed for line monitoring | |
| 6 | 0-V loop[1]) for connector monitoring. This strap must not be inserted if the electronics of the teleprinter are designed for line monitoring | |
| 7 | idle, but may be utilized for external signal equipment | |
| 8 | idle, but may be utilized for external signal equipment | |

Note:

[1]) The strap for the 0-V loop may be inserted in options also on PCB 16

**V. 24/28 MODEM/DATEX**



## 1.7. International Telegraph Alphabet No. 2

| Lochkombinationen Punching Combinations | | | | | | | Deutscher Fernschreiber German Teleprinter | | USA-Fernschreiber USA-Teleprinter | |
|---|---|---|---|---|---|---|---|---|---|---|
| Nr. | 1 | 2 | T | 3 | 4 | 5 | Buchstaben Letters | Ziffern/Zeichen Figures | Buchstaben Letters | Ziffern/Zeichen Figures |
| 1 | ○ | ○ | • | | | | A | - | A | - |
| 2 | ○ | | • | | ○ | ○ | B | ? | B | ? |
| 3 | | ○ | • | ○ | ○ | | C | : | C | : |
| 4 | ○ | | • | | ○ | | D | Wer da? | D | $ |
| 5 | ○ | | • | | | | E | 3 | E | 3 |
| 6 | ○ | | • | ○ | ○ | | F | (frei) | F | ! |
| 7 | | ○ | • | | ○ | ○ | G | (frei) | G | & |
| 8 | | | • | ○ | | ○ | H | (frei) | H | Stop |
| 9 | | ○ | • | ○ | | | I | 8 | I | 8 |
| 10 | ○ | ○ | • | | ○ | | J | Klingel | J | ' |
| 11 | ○ | ○ | • | ○ | ○ | | K | ( | K | ( |
| 12 | | ○ | • | | | ○ | L | ) | L | ) |
| 13 | | | • | ○ | ○ | ○ | M | . | M | . |
| 14 | | | • | ○ | ○ | | N | , | N | , |
| 15 | | | • | | ○ | ○ | O | 9 | O | 9 |
| 16 | | ○ | • | ○ | | ○ | P | 0 | P | 0 |
| 17 | ○ | ○ | • | ○ | | ○ | Q | 1 | Q | 1 |
| 18 | | ○ | • | | ○ | | R | 4 | R | 4 |
| 19 | ○ | | • | ○ | | | S | ' | S | |
| 20 | | | • | | | ○ | T | 5 | T | 5 |
| 21 | ○ | ○ | • | ○ | | | U | 7 | U | 7 |
| 22 | | ○ | • | ○ | ○ | ○ | V | = | V | ; |
| 23 | ○ | ○ | • | | | ○ | W | 2 | W | 2 |
| 24 | ○ | | • | ○ | ○ | ○ | X | / | X | / |
| 25 | ○ | | • | ○ | | ○ | Y | 6 | Y | 6 |
| 26 | ○ | | • | | | ○ | Z | + | Z | " |
| 27 | | | • | | ○ | | Wagenrücklauf | | < | |
| 28 | | ○ | • | | | | Zeilenschaltung | | ≡ | |
| 29 | ○ | ○ | • | ○ | ○ | ○ | Umschaltung Buchstaben | | A... | |
| 30 | ○ | ○ | • | | ○ | ○ | Umschaltung Ziffern/Zeichen | | 1... | |
| 31 | | | • | ○ | | | Zwischenraum (Leertaste) | | SPACE | |
| 32 | | | • | | | | (Nicht benützt) | | | |

# 2. FAULT CLEARING

The symbols on the funcional keys of the basic version can be replaced by terminological expressions or other symbols on the functional keys of special versions. The following listed functional keys are completely identical with each other respectively.

| Key | Basic Version | Special Version |
|---|---|---|
| ON | | |
| OFF | | |
| Local operation | | |
| Answer-back cycle | | |
| Single-step advance of the punched tape with simultaneous transmission | | |
| Single-step advance of punched tape without transmission | | |
| Tape run out in the tape punch | | |
| Tape backspace in the tape punch | | |
| Permanently ON | | |
| New line | [1] | [1] [2] |
| Carriage return | [1] | [2] |

[1] Printing direction from left to right
[2] Printing direction from right to left

CONTENTS Page


2.1. List of Required Tools, Test Aids and Materials ..... 2 — 2

2.2. Signal List ..... 2 — 3

2.3. Location of the Functional Subassemblies ..... 2 — 11

2.4. General Layout of the Fault Tracing Program ..... 2 — 12

2.5. Fault Tracing Program ..... 2 — 13

2.6. Testing within a Fault Clearing Procedure ..... 2 — 49

2.7. Function Testing ..... 2 — 49

2.7.1. General Hints ..... 2 — 49

2.7.2. Keyboard ..... 2 — 49

2.7.3. Tape Punch (ELO) ..... 2 — 49

2.7.4. Tape Reader (LS) ..... 2 — 49

2.7.5. Connection of the Exchange ..... 2 — 49

## 2.1. List of Required Tools, Test Aids and Materials

| Nomenclature | Order No. |
|---|---|
| Screw driver, 5.5 mm | 31010 67300 |
| Screw driver, 4 mm | 31010 67400 |
| Hexagon screw driver (hexagon socket head wrench), 2 mm | 17123 70020 |
| Wrench, double-head, open, 5 × 5.5 mm | 27015 28000 |
| Wrench, double-head, open, 4.5 × 6 mm | 27000 99000 |
| Socket wrench, 5.5 mm | 17121 20901 |
| Socket wrench, 7 mm | 31012 28500 |
| Wrench, closed, 4 × 6 mm | 27000 98700 |
| Spring hook, push-pull, two-sided | 27012 62600 |
| Case with wire gauges, 0.2...0.8 mm | 31010 67800 |
| Feeler gauge set, 0.05...1.0 mm | 31010 67900 |
| Slide gauge | 17811 00115 |
| Tweezers, bent | 31010 68000 |
| Tweezers, straight | 31010 68100 |
| Spring balance 20...250 p | 27094 78067 |
| Spring balance 200...2000 p | 27094 78069 |
| Plug-type connector set with tool set | 17158 00902 |
| Try-square | 17831 20207 |
| Wrench, double head, open/closed 7.0 × 8.5 mm | 27005 61500 |

The following tools and measuring tools are recommended:

| | |
|---|---|
| Punching pliers for coding disk | 17151 18902 |
| Magnetic rod | 17114 47901 |

| Nomenclature | Order No. |
|---|---|
| Dust brush | 31010 68200 |
| Type clearing brush | 31011 85400 |
| Oiler for K-oil | 31010 68402 |
| Gauge for punched tapes | 27005 44000 |
| Adapter board | 57012 15018 |
| Teleprinter oil, 30 $cm^3$ | 31000 28207 |
| Teleprinter grease, 50-g-tube | 31005 38702 |
| Stripping tongs | 17113 40112 |
| Side cutting pliers | 17113 20051 |
| Antistatic pad | 17158 09101 |
| Soldering iron, 220 V / 30 Watts | 17160 01331 |
| Multimeter | 19803 00041 |
| Kneading paste (for type cleaning) | |
| Tool box | 17158 00901 |
| Replacement subassemblies box, electronics | 15731 40002 |
| Replacement subassemblies box, mechanics | 15731 40102 |

## 2.2. Signal List

BU = Socket
LP = PC board
MP = Measuring Point

LSI = Large Scale Integration
LSI 4 may be replaced by LSI 5,
in special versions by LSI 5 A

| Signal | Signal Designation | Connection |
|---|---|---|
| $\overline{\text{ADIS}}$ | Signal "Data in Storage" | LP 37 (LSI 4/21) - BU 4/15 - LP 38/14 |
| $\overline{\text{ANRF}}$ | Call signal | LP 6 / b 18 - LP 7 / b 14 |
| ASLA | Connection line, a-wire | LP 16/1 - Bu 18/17 - Bu 11/2 |
| ASLB | Connection line, b-wire | LP 16/4 - Bu 18/21 - Bu 11/3 |
| $\overline{\text{AT}}$ | Call key (TA 13) | LP 40/2 - Bu 23/7 - LP 37/9 - Bu 26 / C 11 - LP 6 / b 12 - LP 7 / b 9 |
| $\overline{\text{AW}}$ | Selection pulse for type bar select magnet | LP 9 (LSI 3/28 - MP 3) |
| $\overline{\text{AWM}}$ | Energizing time after delay time for the select magnet | LP 9 (LSI 3/27 - MP 5) b 21 - LP 8 / b 14 - / b 8 - Bu 25/E |
| $\overline{\text{BAW}}$ | Change of operation mode; $\overline{\text{BAW}}$ = D2 + $\overline{\text{LOKAL}}$ | LP 6 / b 7 - Bu 26 / C 9 - LP 37/26 - Bu 4/13 - LP 38/12 - LP 9 / b 15 - LP 5 / a 8 |
| $\overline{\text{BELB}}$ | Signal "Bell" interconnected with BUSY | LP 9 / a 30 |
| BELL | External "Bell" | LP 9 / b 8 |
| $\overline{\text{BU}}$ | External BU (LTRS) | LP 9 / a 14 resp. LP 10 / a 14 |
| $\overline{\text{BUSY 2}}$ | Confirmation for a transferred character from tape punch control; $\overline{\text{BUSY 2}}$ = BUSY 3 · T | LP 5 / a 7 - LP 9 / a 19 |
| BUSY 3 | Confirmation for a transferred character from the printing unit control | LP 9 (LSI 3/29 - MP 2) a 18 - LP 5 / a 13 - LP 7 / a 2 resp.<br>LP 9 (LSI 3/29) a 18 - LP 10 / a 18 (MP 1 - LSI 2/15) - LP 5 / a 13 - LP 7 / a 2 |
| $\overline{\text{B1}}$...$\overline{\text{B7}}$ | Information bits | LP 9 (LSI 2/18...24 - LSI 3/5...11) a 2, 3, 4, 6, 7, 8, 10 - LP 7 / b 16, 17, 19, 20, 21, a 27 - LP 5 / b 6, 7, 8, 10, 20 - LP 6 / b 16, 17, 19, 20, 21, 27 resp.<br>LP 10 (LSI 2/18...24) a 2, 3, 4, 6, 7, 8, 10 - LP 9 / a 2, 3, 4, 6, 7, 8, 10 (LSI 3/5...11) - LP 7 / b 16, 17, 19, 20, 21, a 27 - LP 5 / b 6, 7, 8, 10, 20 - LP 6 / a 5, 6, 7, 9, 10 |
| CR | Signal "Carriage Return" | LP 9 (LSI 3/31) b 18 - LP 8 / a 24 |

| Signal | Signal Designation | Connection |
|---|---|---|
| $\overline{DAT}$ | Repeat key (light channel 21) | LP 32 (T 21 E) - Bu 3/26 - LP 37 (LSI 1/32) |
| $\overline{DOE}$ | Marking signal for multiple actuation of keys | LP 37 (LSI 1/25) |
| $\overline{DTB}$ | Repeat key or tabulation marking signal | LP 37 (LSI 1/30 - LSI 4/28) |
| D1 | Transmitted data (interface (LP 6 - LP 16 / LP 12) | LP 6 / b 14 - Bu 18/15 - / 13 - Bu 11/12 resp.<br>LP 6 / b 14 - Bu 18/15 - / 14 - AL 1/1 - St 2/2 |
| D2 | Received data (interface LP 12 / LP 16 - LP 6) | Bu 11/15 - Bu 18/9 - / 11 - LP 6 / a 29 resp.<br>St 2/3 - AL 1/2 - Bu 18/9 - / 8 - LP 6 / a 29 |
| $\overline{ED}$ | Serial input for telegraph characters received | LP 6 / a 12 - LP 9 / a 26 (LSI 2/35) - Bu 15/10 - Bu 26 / C 8 - LP 37/35 (LSI 4/24) resp.<br>LP 6 / a 12 - LP 10 / a 26 (LSI 2/35) - Bu 9 / a 26 - Bu 15/10 - Bu 26 / C 8 - LP 37/35 (LSI 5 A / 24) |
| EDG | Received data for break-in recognition | LP 6 /a 19 - Bu 26 / C 8 - LP 37/35 |
| $\overline{ELOST}$ | Start ELO (tape punch) | LP 5 / b 14 - LP 9 / a 15 |
| $\overline{EMPF}$ | Recognition of sequence characters | LP 9 / a 13 - LP 10 / a 5 |
| $\overline{ENQB}$ | Signal "Station Request" (WHO ARE YOU) interconnected with BUSY | LP 9 / b 17 - LP 5 / b 15 |
| $\overline{EXA}$ | External punch switch-off | LP 5 / a 29 |
| $\overline{EXE}$ | External punch switch-on | LP 5 / a 24 |
| E1L | Start-of-line switch | E 1/2 - LP 9 / b 14 |
| E2R | End-of-line switch | E 2/C - LP 9 / b 16 |
| $\overline{FB}$ | Signal "Color Ribbon | LP 9 / a 9 - LP 7 / a 18 - LP 8 / a 1 |
| FBex. | External color ribbon control | LP 6 / a 23 |
| $\overline{FBM}$ | Energizing of color ribbon solenoid | LP 9 / a 23 |
| $\overline{FBR}$ | Energizing of color ribbon solenoid RED | LP 8 / a 10 - Bu 25/N |
| $\overline{FBS}$ | Energizing of color ribbon solenoid BLACK | LP 8 / a 2 - Bu 25/J |
| FBÜR | Overexcitation of color ribbon solenoid RED | LP 8 / a 18 - Bu 25/K |
| FBÜS | Overexcitation of color ribbon solenoid BLACK | LP 8 / a 8 - Bu 25/H |

| Signal | Signal Designation | Connection |
|---|---|---|
| $\overline{FOL}$ | Marking a character sequence | LP 37 (LSI 1/27 - LSI 4/10) |
| $\overline{FT}$ | Interrogation pulse for keyboard sequences | LP 37 (LSI 4/8 - LSI 1/24) |
| FTI1...10 (C) | Photo-transistor information 1 to 10 | LP 32 (T1...10) Bu 3 - LP 37 (LSI 1/7...16) |
| $\overline{GRS}$ | Basic setting signal as a function of $V_{SS}$ and T | LP8 (MP1) b11 - LP9 / b11 (LSI 2/13) - LP5 / a9 - LP6 / a25 - LP7 / a26 resp.<br>LP8 (MP1) b11 - LP9 / b11 - LP10 / b11 (LSI 2/13) - LP5 / a9 - LP6 / a25 - LP7 / a26 |
| $\overline{GRS\ 2}$ | Basic setting signal with motor at standstill; GRS 2 = LOKAL + MOFF | LP6 / a13 - LP7 / a9 - Bu 26 / C12 - LP 37/13 |
| $\overline{GRS\ S}$ | Basic setting of transmitter; $\overline{GRS\ 2}$ delayed | LP 37 (LSI 1/19 - LSI 4/30) - Bu 4/12 - LP 38/11 |
| $\overline{GST}$ | Break-in clock pulse | LP 37 (LSI 4/38) |
| $\overline{GS\ 1}$ | Break-in pulse GS 1 = (TKG · $\overline{GST}$ + $\overline{TKG}$ · GST) · (ED · $\overline{SD}$ + $\overline{ED}$ · SD) | Bu 4/14 - LP 38/13 |
| G 1 S | 1-second clock pulse (≙ 1 Hz) | LP 9 (LSI 2/26) a25 - LP 8 / b18 resp.<br>LP 10 (LSI 2/26) a25 - LP 8 / b18 - Bu 9 / a25 |
| G6 | 600-Hz clock pulse | LP 9 (LSI 2/39) a28 - LP6 / b21 - LP7 / a28 resp.<br>LP 10 (LSI 2/39) a28 - LP6 / b21 - LP7 / a28 - Bu9 / a28 |
| G 192 | Keyboard clock pulse (19.2 kHz ≙ TMOK) | LP9 / a11 - Bu 26 / A10 - LP 37 (LSI 1/22) 15 - Bu 4/16 - LP 38/15 |
| $\overline{IB\ 1}$...$\overline{IB\ 6}$ | Data outputs B1 to B7 | LP 37 (LSI 1/33, 35...39 - LSI 4/14...19) |
| KB 1... KB 5 | Answer-back bits 1 to 5 | LP 4 (T1...5) - Bu 20/1...5 - Bu 26 / A5, B4, B6, C5, C4 - LP 37 (22, 23, 32...34) |
| $\overline{KGE}$ | Answer-back unit ON | LP 37 (LSI 4/29) |
| $\overline{KL}$ | Signal "Bell" | LP9 (LSI 3/19) b10 - Bu 26 / C6 - LP 37/31 |
| $\overline{KLI}$ | Marking 10 characters before end-of-line | LP 37 (LSI 4/22) |
| $\overline{KLM}$ | Energizing of pawl magnet | LP8 / a31 - pawl magnet |
| $\overline{LAA}$ | Indication "Tape Punch OFF" (LD1) | LP 1/11 - Bu 17 / A3 - LP 5 / a19 |
| $\overline{LAC}$ | External "Tape Reader OFF" | LP 37/28 |
| $\overline{LADE}$ | Indication "Tape Punch PERMANENTLY ON" (LD3) | LP 1/9 - Bu 17 / C3 - LP 5 / a16 |

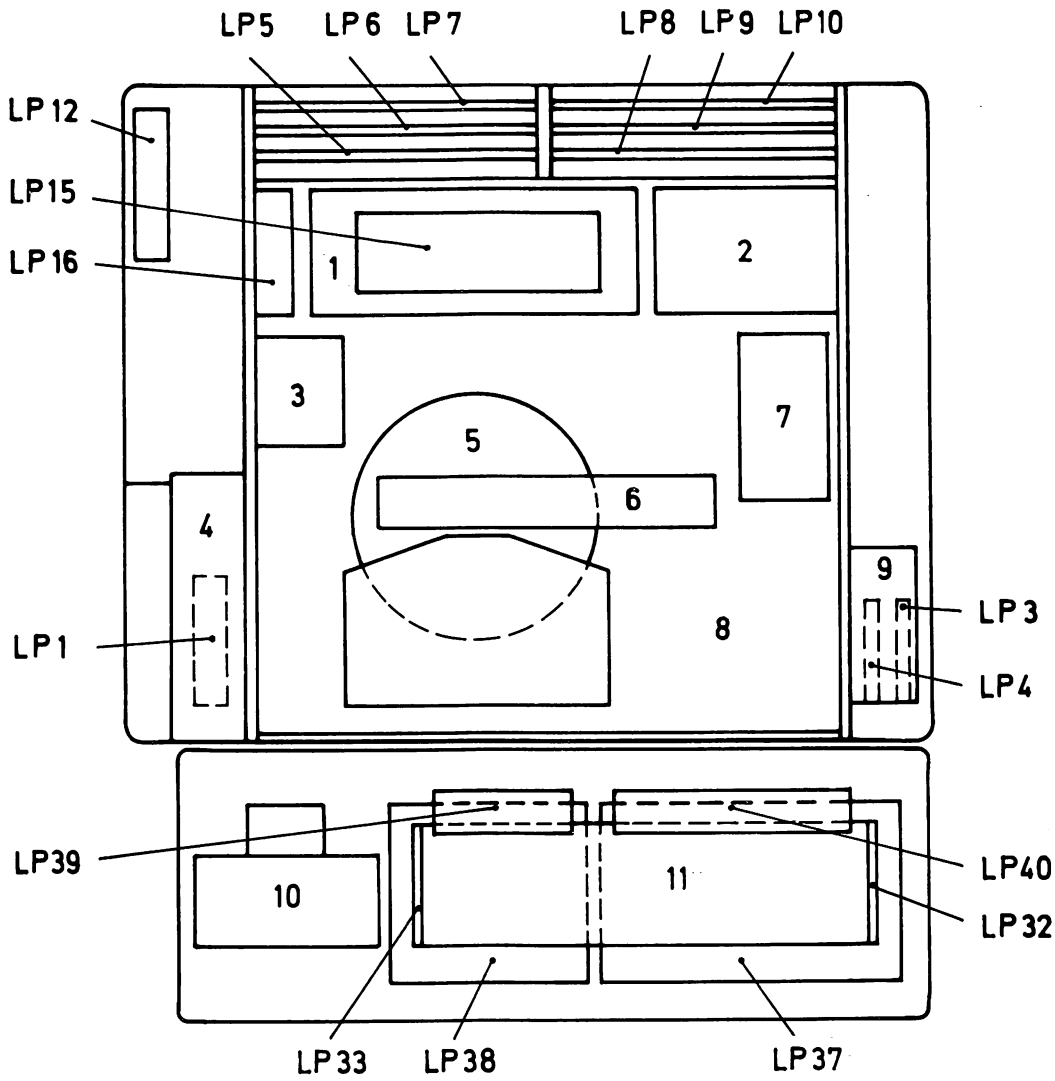
| Signal | Signal Designation | Connection |
|---|---|---|
| $\overline{\text{LADOE}}$ | Indication "Double Recognition" (LD8) | LP 37 (LSI 1/25) - Bu 23/4 - LP 40/1 |
| $\overline{\text{LAE}}$ | Indication "Tape Punch ON" (LD2) | LP1/10 - Bu17 / B3 - LP5 / a14 |
| $\overline{\text{LAEN}}$ | Indication "Printing operation" (LD15) | LP 6 / b15 - Bu 26 / A12 - LP 37/19 - Bu 23/10 - LP 40/6 |
| $\overline{\text{LALA}}$ | Indication "Tape Reader OFF" (LD7) | LP 39/10 - Bu 21/13 |
| $\overline{\text{LALE}}$ | Indication "Tape Reader ON" (LD6) | LP 39/9 - Bu 21/15 |
| $\overline{\text{LALK}}$ | Indication "Local" (LD 14) | LP 6 / b16 - Bu 26 / C10 - Bu 23/8 - LP 40/3 |
| $\overline{\text{LAS}}$ | Indication "Teletypewriting operation" (LD 15) | LP 6 / b15 - Bu 26 / A12 - LP 37/19 - Bu 23/10 - LP 40/6 |
| $\overline{\text{LASA}}$ | Indication for external signaling equipment | Bu 23/5 - LP 40/5 - LP 37/12 - Bu 26 / B1 - LP 7 / b12 |
| $\overline{\text{LATSP}}$ | Indication "Keyboard Lock" (LD9); $\overline{\text{LATSP}} = \overline{\text{TSM + BAW}}$ | Bu 22/5 - LP 40/13 |
| $\overline{\text{LAWA}}$ | Indication "Select request" (LD 13); $\overline{\text{LAWA}} \triangleq \overline{\text{WA}}$ (B-signaling).<br>In special versions indication "Line monitoring"<br>(e. g. A-signaling) | Bu 23/6 - LP 40/4 |
| $\overline{\text{LEC}}$ | External "Tape Reader On" | LP 37/8 |
| LED. K | Cathode of light emitting diodes in keyboard | Bu 3/6 - LP 33/2 |
| $\overline{\text{LEE}}$ | Signal "Tape Reader ON" | Bu 4/3 - LP 38/3 |
| LF | Signal "Line Feed" | LP 9 (LSI 3/22) b19 - LP 8 / a29 |
| $\overline{\text{LFM}}$ | Energizing of line feed magnet | LP 8 / a30 - Bu 19/5 |
| $\overline{\text{LOKAL}}$ | Local operation | LP 6 / a1 - LP 9 / a31 - LP 8 / b16 resp.<br>LP 6 / a1 - LP 10 / a31 - LP 8 / b16 - Bu 9 / a31 |
| LP | Line polarity | Bu 11/14 - LP 6 / a28 |
| LS | Line current | Bu 11/13 - LP 6 / b8 |
| $\overline{\text{LT}}$ | Local key (TA 14) | LP 40/8 - Bu 23/9 - LP 37/19 - Bu 26 / B10 - LP 6 / a14 |
| LÜ | Line monitoring | Bu 11/10 - LP 6 / a23 |
| $\overline{\text{MOFF}}$ | Motor flip-flop | LP 6 / b19 - LP 7 / b18 |

| Signal | Signal Designation | | Connection |
|---|---|---|---|
| MOK | Motor speed o. k. | | LP 9 (LSI 3/17) a12 - LP 7 / b13 - Bu 15/6 resp.<br>LP 9 (LSI 3/17) a12 - LP 10 / a12 - LP 7 / b13 - Bu 15/6 |
| MOT EIN | "Motor ON"; MOT EIN = $\overline{WA \cdot G6} \cdot \overline{GRS\,2 \cdot \overline{FB}} \cdot \overline{GRS}$ | | LP 7 / a11 (LP 6 / a11) - Bu 15/8 |
| MOTS | "Motor ON" with built-in motor switch | | Bu 15/7 - LP 8 / b19 - LP 9 / a16 - LP 6 / a15 - LP 5 / a18 resp.<br>Bu 15/7 - LP 8 / b19 - LP 10 / a16 - LP 6 / a15 - LP 5 / a18 - Bu 9 / a16 |
| $\overline{MT}$ | Energizing of tape punch feed magnet | | Bu 13/6 - LP 5 / a20 |
| $\overline{M1}$... $\overline{M5}$ | Energizing of punch magnets | | Bu 12 and Bu 13 - LP 5 / a12, 30, b5, 11, 18 |
| M1 | Data set ready | V. 24/28 MODEM/DATEX | St 2/6 - AL 1/4 - Bu 18/13 - /12 - St 11/12 - /13 - LP 6 / b8 |
| M2 | Ready for sending | | St 2/5 - AL 1/3 - Bu 18/21 - /20 - St 11/3 - /14 - LP 6 / a28 |
| M3 | Calling indicator | | St 2/22 - AL 1/8 - Bu 18/17 - /16 - St 11/2 - /8 - LP 6 / b6 |
| M5 | Data channel received line signal detector | | St 2/8 - AL 1/6 - Bu 18/11 - /10 - St 11/15 - /20 - LP 6 / a30 |
| $\overline{NIG\,1}$ | Zero pulse digitalized | | LP 8 (MP 3) b7 - LP 9 / b7 |
| NIG 2 | Zero pulse interconnected with $\overline{GRS}$ | | LP 9 / b6 - LP 5 / a6 |
| NIGB | Zero pulse from carrousel (analog signal) | | Bu 25 / D - LP 8 / b6 |
| NLÜT | New line transfer clock pulse | | LP 9 / b9 - LP 7 / b15 |
| N 12 V | + 12 V combined with MOT EIN (answer-back unit) | | Bu 15/1 - Bu 20/9 |
| $\overline{P1}$... $\overline{P5}$ | Data entry 2, bits 1 to 5 (from tape reader) | | LP 35/1...5 - Bu 1/1...5 - LP 37 (LSI 4/2, 31, 32, 35, 40) |
| PE | End of paper (≙ PEK) | | Bu 19/1 - LP 6 / b13 |
| $\overline{RSMS}$ | Resetting motor switch | | LP 6 / a31 - Bu 15/20 |
| RS 2 | RED/BLACK recognition | | LP 9 (LSI 2/25) resp.<br>LP 10 (LSI 2/25) b8 - LP 9 / b8 |
| $\overline{RS\,3}$ | RED/BLACK recognition; $\overline{RS\,3}$ = RS 2 · BUSY 3 | | LP 9 / a5 - LP 8 / a9 |
| $\overline{SA}$ | Clear key (TA 12) for external signaling equipment | | LP 40/11 - Bu 22/6 - LP 37/14 - Bu 26 / A 2 - LP 7 / b11 |
| SAKO 1 | SA contact 1 | | LP 7 / b7 - Bu 18/4 |

| Signal | Signal Designation | Connection |
|---|---|---|
| SAKO 2 | SA contact 2 | LP 7 / b 8 - Bu 18/2 |
| $\overline{\text{SD}}$ (SD 1) | Serial telegraph character | LP 37 (LSI 4/37) 7 - Bu 26 / A 9 - LP 9 / a 27 (LSI 2/9) - LP 6 / a 3, 4 - Bu 15/9 - LP 7 / a 4 resp.<br>LP 37 (LSI 5 A/37) 7 - Bu 26 / A 9 - Bu 9 / a 27 - LP 10 / a 27 (LSI 2/9) - LP 6 / a 3, 4 - Bu 15/9 - LP 7 / a 4 |
| SD 2 | Color ribbon control signal | LP 6 / a 3 - LP 9 / a 27 - resp. LP 10 / a 27 |
| SET | Transmit clock pulse = 32 × baud number (≙ G 24) | LP 9 (LSI 2/6) a 22 - Bu 26 / C 7 - LP 37 (LSI 4/11) resp.<br>LP 10 (LSI 2/6) a 22 - Bu 9 / a 22 - Bu 26 / C 7 - LP 37 (LSI 5 A/11) |
| SH 3 | Signal for change-over into 3rd shift | LP 9 / a 29 resp. LP 10 / a 29 |
| SKIP | Key "Skip" (TA 9) | LP 39/3 - Bu 21/17 |
| $\overline{\text{SML}}$ | Input suppression for F, G, H after figures-shift code | LP 37 (LSI 4/23) |
| $\overline{\text{SSL 2}}$ | Selection of stop bit length | LP 37 (LSI 4/3) |
| $\overline{\text{ST}}$ | Clear key (TA 15) | LP 40/7 - Bu 23/3 - LP 37/21 - Bu 26 / A 11 - LP 6 / a 26 - LP 7 / b 10 |
| $\overline{\text{STA}}$ | Start bit for tape reader | LP 37 (LSI 4/36 - MP 2) - Bu 4/6 - LP 38/6 |
| STAE | Start recognition | LP 37 (LSI 1/6 - MP 1) |
| $\overline{\text{STE}}$ | End-of-tape contact (Tape Reader) | End-of-tape contact - Bu 2/2 |
| $\overline{\text{STEP}}$ | Key "Step" (TA 8) | LP 39/6 - Bu 21/10 - LP 38/5 - Bu 4/5 |
| STÜ | Line current plug monitoring | Bu 18/7 - Bu 11/10 - LP 6 / a 23 |
| $\overline{\text{STZ}}$ | Tape tension (Tape Reader) | Bu 2/3 |
| $\overline{\text{SUMM}}$ | Buzzer | Bu 23/2 - LP 40/9 |
| S1 | Connect data set to line resp.<br>Data terminal ready | LP 6 / a 23 - Bu 18/7 - /6 - AL 1/7 - St 2/20 |
| T | 307.2-kHz clock pulse | LP 9 / b 5 (MP 4) - LP 8 / b 5 - Bu 26 / A 8 - LP 37 (LSI 4/12) 16 - LP 5 / a 11 - LP 6 / b 9 resp.<br>LP 10 / b 5 (MP 3) - LP 9 / b 5 - Bu 26 / A 8 - LP 37 (LSI 5 A/12) 16 - LP 5 / a 11 - LP 6 / b 9 |

| Signal | Signal Designation | Connection |
|---|---|---|
| $\overline{TAA}$ | Key "Tape Punch OFF" (TA 1) | LP 1/8 - Bu 17/C2 - LP 5/a26 |
| $\overline{TABU}$ | Key "Letters Shift" (TA 5) | LP 1/3 - Bu 17/C1 - LP 5/a5 |
| $\overline{TADE}$ | Key "Tape Punch PERMANENTLY ON" (TA 3) | LP 1/2 - Bu 17/B1 - LP 5/a22 |
| $\overline{TAE}$ | Key "Tape Punch ON" (TA 2) | LP 1/1 - Bu 17/A1 - LP 5/a21 |
| $\overline{TAKG\,1}$ | Key "Answer-back Unit 1" (TA 10) | LP 40/15 - Bu 22/7 |
| $\overline{TAKG\,2}$ | Key "Answer-back Unit 2" (TA 11) | LP 40/16 - Bu 22/8 |
| TIG | Clock pulse generator | LP 4 (T7) - Bu 20/7 - Bu 26/A6 - LP 37/24 |
| $\overline{TKG}$ | Answer-back clock pulse | LP 37 (LSI 4/25) |
| $\overline{TLA}$ | Key "Tape Reader OFF" (TA 7) | LP 39/7 - Bu 21/11 |
| $\overline{TLE}$ | Key "Tape Reader ON" (TA 6) | LP 39/8 - Bu 21/19 |
| $\overline{TM}$ | Energizing of feed magnet | LP 8/a20 - feed clutch |
| $\overline{TMI}$ | Feed signal | LP 9 (LSI 3/30) a1 - LP 8/a22 |
| TMOK | Clock frequency for motor speed control (≙ 19,2 kHz ≙ G192) | LP 9 (LSI 3/18) a11 - LP 10/a11 - Bu 26/A10 - LP 37 (LSI 1/22) 15 - Bu 4/16 - LP 38/15 |
| TMÜ | Overexcitation of feed magnet | LP 8/a28 - feed clutch |
| $\overline{TSM}$ | Marking for keyboard locking | LP 37 (LSI 4/27) |
| $\overline{TT}$ | Keyboard pulse (data output pulse) | LP 37 (LSI 1/28 - LSI 4/13) |
| $\overline{TU}$ | Feed suppression | LP 10/a24 - Bu 9/a24 |
| T2T | Allocation clock pulse for second answer-back unit | LP 4 - Bu 20/6 - Bu 26/B5 - LP 37/36 |
| $V_{CC}$ | Supply voltage + 5 V | Bu 15/12 |
| $V_{DD}$ | Supply voltage 0 V | Bu 15/2, 3, 4 |
| $V_{GG}$ | Supply voltage —14 V (—12 V) | Bu 15/11 (Bu 15/13) |
| $V_{SS}$ | Supply voltage + 12 V | Bu 15/15, 16 |

| Signal | Signal Designation | Connection |
|---|---|---|
| WA | Condition "Selection request" (B-signaling).<br>In special versions "Line monitoring" (e. g. A-signaling) resp.<br>"Indication Motor On" (point-to-point connection) | LP 6 / b11 - Bu 26 / B11 - LP 37/27 |
| $\overline{WA}$ | WA negated | LP 6 / a16 - LP 7 / a10 |
| WAA | "Selection request start" signal | LP 7 / a1 - LP 9 / b12 |
| WAU | Selection mode change-over; WAU = 2 DRE | LP 6 / b20 - LP 7 / a3 |
| $\overline{WD}$ | "Who Are You" signal | LP 9 / b13 - Bu 26 / B8 - LP 37/11 |
| WEZ | Energizing of maintenance units counter | LP 8 / b12 - WEZ |
| WI | Selection pulses | LP 7 / a6 - LP 6 / a2 |
| W1...W4 | Winding connections of reader motor | Bu 2/5 ... 8 - step motor |
| X, Y, Z | Inputs for adjusting the receiving speed (50, 75, 100 bauds) | LP 9 (LSI 2/2, 3, 40) |
| $\overline{ZEW1}$ | Selection of line length | LP 37 (LSI 4/6) |
| $\overline{ZEW2}$ | Selection of line length | LP 37 (LSI 4/7) |
| ZI | External ZI | LP 9 / a17 resp. LP 10 / a17 |
| $\overline{ZIG1}$ | Counting pulses digitalized | LP 8 (MP 2) b20 - LP 9 / b20 |
| ZIGB | Counting pulses from carrousel (analog signal) | Bu 25/B - LP 8 / b10 |
| ZV resp. ZV2 | Signal "Character is available" | LP 9 (LSI 2/17 - MP 1 - LSI 3/12) a21 - LP 7 / a12 - LP 5 / b21 resp.<br>LP 10 (LSI 2/17 - MP 2) a21 - LP 9 / a21 (LSI 3/12) - LP 7 / a12 -<br>LP 5 / b21 |
| $\overline{ZVV}$ | Line feed locking from dial pulse generator | LP 7 / a8 - LP 9 / a20 - resp. LP 10 / a20 |
| 1 Hz | 1-Hz clock pulse (≙ G1 S) | LP 9 (LSI 2/26) a25 - LP 8 / b18 |
| 2 DRE | 2-wire single-current | Bu.11/20 - LP 6 / a30 |
| 4 × S | Recognition circuit for a sequence of 4 × S<br>(International Telegraph Alphabet No. 2 only) | LP 9 (LSI 2/29) |
| 25 Hz | 25-Hz clock pulse | LP 7 / a22 - LP 6 / a22 |
| $\overline{32.}$ | 32nd combination | LP 5 / b12 |
| 600 Hz | 600-Hz clock pulse (≙ G6) | LP 9 (LSI 2/39) a28 - LP 6 / b21 - LP 7 / a28 |




LP 1 Functional Keys for Tape Punch (in housing cover)
LP 3 Answer-back Unit/Transmitter
LP 4 Answer-back Unit/Receiver
LP 5 Tape Punch Control
LP 6 Subscriber Unit 1 (FSE 1) resp.
V. 24/28 MODEM/DATEX resp.
BSW Adapter
LP 7 Subscriber Unit 2 (FSE 2)
LP 8 Final Stages
LP 9 Printing Unit Control resp. Printing Unit Control 1
LP 10 Printing Unit Control 2 resp.
Character Recognition
LP 12 Line Adaptation (LAT) resp.
LAT Shorting Connector
LP 15 Power Supply Unit
LP 16 Filter resp.
Connecting Plate V. 24 resp.
BSW (BSU) Connecting Plate

LP 32 Light Barrier Receiver
LP 33 Light Barrier Transmitter
LP 37 Transmitter Control
LP 38 Tape Reader Control
LP 39 Functional Keys for Tape Reader
LP 40 Functional Keys for Subscriber Unit
and Answer-Back Unit

1 Power Supply
2 Motor
3 Carriage Return Drum
4 Tape Punch (ELO)
5 Printing Unit
6 Paper Guide
7 Feed Gear
8 Frame
9 Answer-back Unit
10 Tape Reader (LS)
11 Keyboard

## 2.4. General Layout of the Fault Tracing Program


Page

10 Local Operation:

Telex ..... 2 — 15
Fig. 2-1 Flow diagram Local Operation ..... 2 — 17

Point-to-Point Connection ..... 2 — 15.1
Fig. 2-1 Flow diagram Local Operation ..... 2 — 17.1

V. 24/28 MODEM/DATEX ..... 2 — 15.2
Fig. 2-1 Flow diagram Local Operation ..... 2 — 17.2

20 Line Operation
(Outgoing resp. Incoming Call):

Telex ..... 2 — 19
Fig. 2-2 Flow diagram Outgoing Call ..... 2 — 23

Point-to-Point Connection ..... 2 — 19.1
Fig. 2-2.1 Flow diagram Outgoing Call
(Point-to-Point Connection) ..... 2 — 23.1

V. 24/28 MODEM/DATEX ..... 2 — 19.2
Fig. 2-2.2 Flow diagram Outgoing Call
(V. 24/28 MODEM/DATEX) ..... 2 — 23.2

30 Carriage Return ..... 2 — 25

40 Carriage Drive ..... 2 — 26

50 Paper Feed ..... 2 — 27

Page

60 Repeat Key [....] or Continual Printing ..... 2 — 28

70 Erratic Functions at the actuation of the "sequential character" keys (E. g. ä, ö, ü, CRLF [New Line]) ..... 2 — 28

80 Printing ..... 2 — 29
Fig. 2-3 Flow diagram Printing Operation ..... 2 — 31

90 Color Ribbon Feed Mechanism ..... 2 — 33

100 Buzzer ..... 2 — 36

110 Change of Operation Mode ..... 2 — 37
Fig. 2-4 Flow diagram Change of Operation Mode ..... 2 — 39

120 Answer-back Unit ..... 2 — 41

130 Tape Punch (ELO) ..... 2 — 42

140 Tape Reader (LS) ..... 2 — 43
Fig. 2-5 Flow diagram Basic Position with Mains Connection .. 2 — 45
Fig. 2-6 Flow diagram Internal Power Supply ..... 2 — 47

## 2.5. Fault Tracing Program

The Fault Tracing Program ist divided in:

— fault hints for local and line operation (test sections 10 to 20).

**These hints are recorded upon differently colored paper separated for:**

Telex (pink color)
Point-to-Point Connection (yellow color)
V. 24/28 MODEM/DATEX (blue color)

— generally valid fault hints in case of special functional operations (test sections 30 to 140) upon white paper.

**Preliminary remark**

1. With the teleprinter being operational the signals which are quoted in the column "Test Procedure" should be present. Clamp the negative line of the multimeter to a bare metal part of the machine. Connect the positive line with the test point indicated for each particular measurement in the column "Test Procedure"

2. In case of wiring breaks, perform resistance measurements as safeguard on the cable and wire connections when the mains plug is pulled.

3. The suspected assemblies are to be replaced in the indicated sequence until the fault disappears.

4. During fault tracing the local operation has priority.

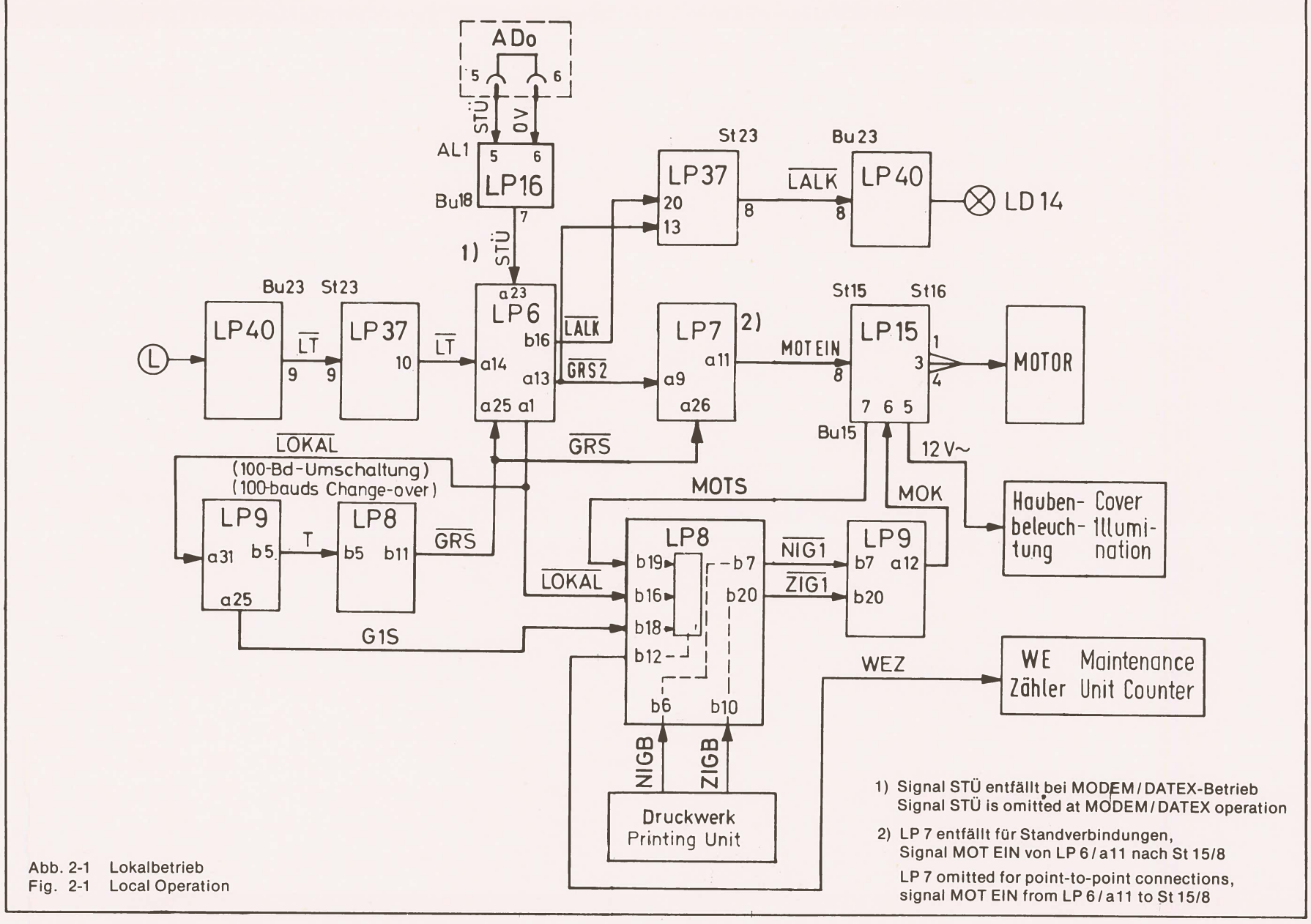
5. For the operation of the teleprinter it is necessary that
   - the mains plug and the line current plug are inserted
   - the paper is loaded into the teleprinter.

6. A0X resp. F0X = Functional Issue.

7. LP ≙ Printed Circuit Board.

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **10 Local Operation**<br>Depress local key (L) | | | |
| 11 Motor starts only momentarily | Mechanical tightness of printing unit | Check type carrousel and paper guide (paper plate) | Replace printing unit resp. paper guide. If need be, bend the paper plate appropriately.<br>**(Attention!**<br>Check subsequently fuse Si1) |
| 12 Motor does not start. Indication "Local" (LD 14) does not light | 1. Mains or telegraph plug is pulled | Check mains or telegraph plug | Establish mains or telegraph connection |
| | 2. Power supply is interrupted | Check fuse of the connection arrangement | Replace fuse |
| | 3. Telegraph line has wrong polarity | Measurement in free condition:<br>1. Two-wire single current: LP 16 AL 1 terminal 1 must be positive with respect to terminal 4<br>2. Four-wire single current: terminal 3 must be positive with respect to terminal 4 (receive line), transmit line (terminal 1 and 2) is short-circuited<br>3. Double current (polar current) terminal 1 must be negative with respect to terminal 2 (transmit line), terminal 3 must be positive with respect to terminal 4 (receive line) | Establish correct polarity |
| | 4. Fuses on LP 15 are defective | Check all fuses on LP 15 | Replace defective fuses. Check subsequently voltages |
| | 5. Local key is defective | Measurement: Bu 23/9<br>Signal $\overline{LT}$ (+12 V to 0 V) | Replace LP 40 |
| | 6. Interruption between Bu 23/9 and LP 37/10 | Measurement: LP 37/10<br>Signal $\overline{LT}$ (+12 V to 0 V) | Replace LP 37 |
| | 7. Interruption between LP 37 and LP 6 (cable break) | Measurement: LP 6 / a14<br>Signal $\overline{LT}$ | Establish connection |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 12 continued | 8. LP 9 resp. LP 10 is faulty, clock T = 307.2 kHz is not available | Measurement: LP 9 / b5 (MP 4) resp. LP 10 / b5 (MP 3) Signal T approx. +5 V | Replace LP 9 resp. LP 10 |
| | 9. Interruption between LP 9 (LP 10) and LP 8 | Measurement: LP 8 / b5 Signal T approx. +5 V | Establish connection (LP 11) |
| | 10. LP 8 is faulty, signal $\overline{GRS}$ is not available | Measurement: LP 8 / b11 (MP 1) Signal $\overline{GRS}$ +12 V | Replace LP 8 |
| | 11. Interruption between LP 8 and LP 6 or LP 7 | Measurement: LP 6 / a25 or LP 7 / a26 Signal $\overline{GRS}$ +12 V | Establish connection (LP 11) |
| | 12. LP 12 is faulty | Measurement: LP 6 / a29 Signal D2 +12 V | Replace LP 12 |
| | 13. Strap L inserted on LP 6 and no paper loaded | Check LP 6 Strap L ≙ End-of-paper contact active also in local operation | Remove strap L |
| 13 Motor does not start. Indication "Local" (LD 14) lights | 1. Fuse Si 1 on LP 15 is defective | Check fuse | Replace fuse |
| | 2. LP 6 is faulty, signal $\overline{GRS\,2}$ is not available | Measurement: LP 6 / a13 Signal $\overline{GRS\,2}$ +12 V | Replace LP 6 |
| | 3. Interruption between LP 6 and LP 7 | Measurement: LP 7 / a9 Signal $\overline{GRS\,2}$ | Establish connection (LP 11) |
| | 4. LP 7 is faulty, signal MOT EIN is not available | Measurement: LP 7 / a11 Signal MOT EIN +12 V | Replace LP 7 |
| | 5. Interruption between LP 7 and LP 15 | Measurement: (LP 15) St 15/8 Signal MOT EIN | Establish connection |
| | **Attention! Change measuring range. Alternating voltage V ~** | | |
| | 6. Transformer is defective, no 110-V voltage is supplied to LP 15 | Measurement: (LP 15) St 16/3 approx. 114 V ~ | Replace power supply unit |
| | 7. Motor is defective | Measurement: (LP 15) St 16/4 and 1 Rest condition 110 V ~ | Replace motor |
| | 8. Power supply unit is defective | Measurement: (LP 15) St 16/4 and 1 When the key "Local" is depressed at pin 4: 110 V ~ to approx. 190 V ~ at pin 1: 110 V ~ to 0 V | Replace power supply unit |




1) Signal STÜ entfällt bei MODEM/DATEX-Betrieb
Signal STÜ is omitted at MODEM/DATEX operation

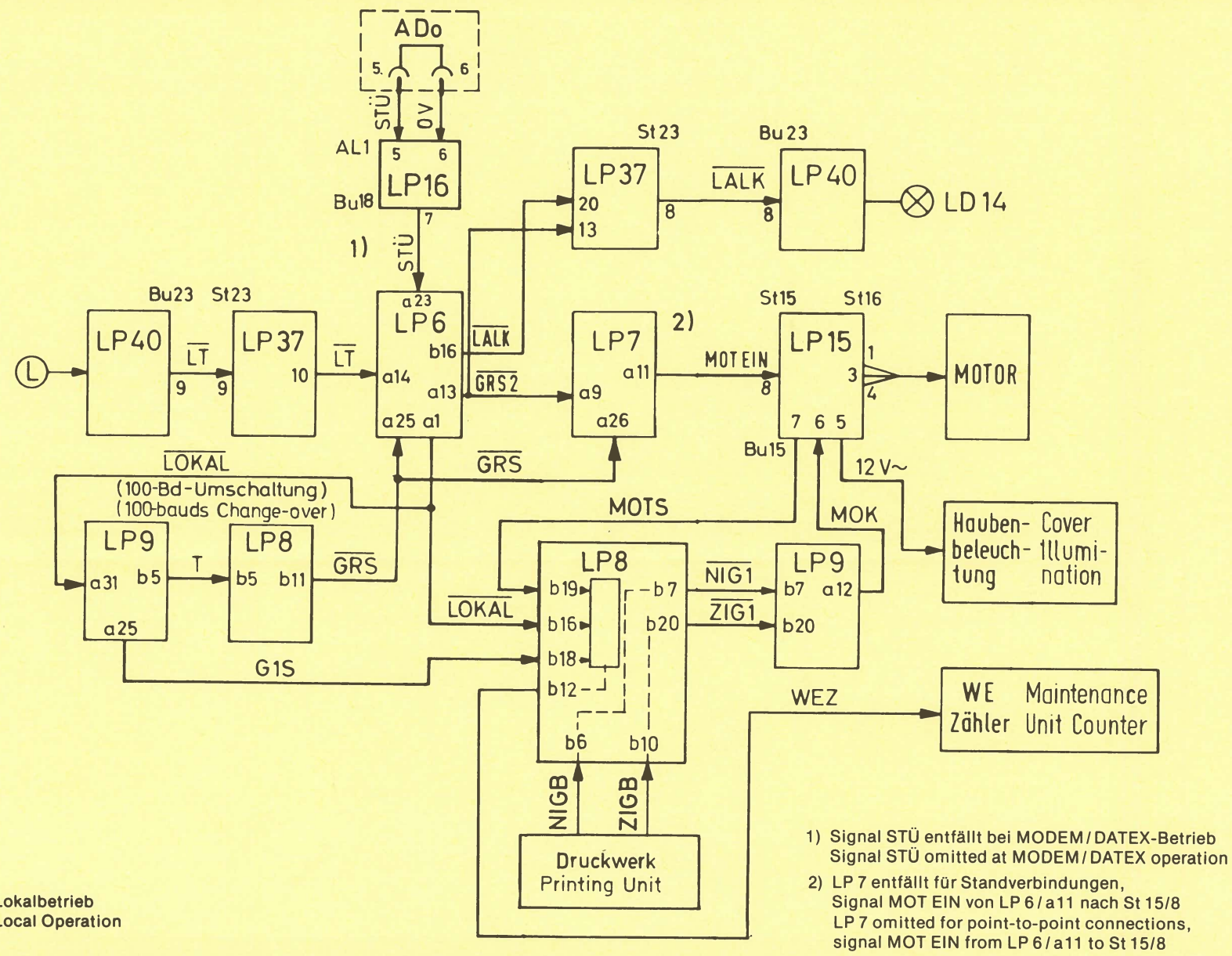
2) LP 7 entfällt für Standverbindungen,
Signal MOT EIN von LP 6/a11 nach St 15/8
LP 7 omitted for point-to-point connections,
signal MOT EIN from LP 6/a11 to St 15/8

Abb. 2-1 Lokalbetrieb
Fig. 2-1 Local Operation

**POINT-TO-POINT CONNECTION**

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| Motor is switched on with mains voltage applied and it is not switched off by the motor switch *(strap MEI on LP 6 is not inserted)* No data communication, no printing is possible | 1. Single current: Signal D2 is permanent +12 V | | |
| | — Telegraph line has wrong polarity *(only with LP 12 not arranged for independence of line polarity; strap E is inserted)* | Measurement in free condition: connecting box terminal 1 must be negative with respect to terminal 4 | Replace LP 12 by a LP 12 arranged for independence of line polarity *(strap F inserted)* |
| | — LP 12 is faulty | Measurement: Bu 11/15 Signal D2 —12 V | Replace LP 12 |
| | 2. Double (polar) current: Receive line is wrong connected to LP 16 AL 1/3 and 4 | Measurement: Bu 18/9 Signal D2 —12 V | Establish the correct connection on LP 16 AL 1 |
| **10.1 Local Operation** Depress local key (L) | | | |
| 11.1 Motor starts only momentarily | Mechanical tightness of printing unit | Check type carrousel and paper guide (paper plate) | Replace printing unit resp. paper guide. If need be, bend the paper plate appropriately. (Attention! Check subsequently fuse Si 1) |
| 12.1 Motor does not start. Indication "Local" (LD 14) does not light | 1. Mains or telegraph plug is pulled | Check mains or telegraph plug | Establish mains or telegraph connection |
| | 2. Power supply is interrupted | Check fuse of the connection arrangement | Replace fuse |
| | 3. Fuses on LP 15 are defective | Check all fuses on LP 15 | Replace defective fuses. Check subsequently voltages |
| | 4. Local key is defective | Measurement: Bu 23/9 Signal $\overline{LT}$ (+12 V to 0 V) | Replace LP 40 |
| | 5. Interruption between Bu 23/9 and LP 37/10 | Measurement: LP 37/10 Signal $\overline{LT}$ (+12 V to 0 V) | Replace LP 37 |
| | 6. Interruption between LP 37 and LP 6 (cable break) | Measurement: LP 6/a14 Signal $\overline{LT}$ | Establish connection |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 12.1 continued | 7. LP 9 resp. LP 10 is faulty, clock T = 307.2 kHz is not available | Measurement: LP 9 / b5 (MP 4) resp. LP 10 / b5 (MP 3) Signal T approx. +5 V | Replace LP 9 resp. LP 10 |
| | 8. Interruption between LP 9 (LP 10) and LP 8 | Measurement: LP 8 / b5 Signal T approx. +5 V | Establish connection (LP 11) |
| | 9. LP 8 is faulty signal $\overline{GRS}$ is not available | Measurement: LP 8 / b11 (MP 1) Signal $\overline{GRS}$ +12 V | Replace LP 8 |
| | 10. Interruption between LP 8 and LP 6 | Measurement: LP 6 / a25 Signal $\overline{GRS}$ +12 V | Establish connection (LP 11) |
| | 11. LP 6 is faulty, signal MOT EIN is not available | Measurement: LP 6 / a11 Signal MOT EIN +12 V | Replace LP 6 |
| 13.1 Motor does not start. Indication "Local" (LD 14) lights | 1. Fuse Si 1 on LP 15 is defective | Check fuse | Replace fuse |
| | 2. Interruption between LP 6 and LP 15 signal MOT EIN is not available | Measurement: (LP 15) St 15/8 Signal MOT EIN +12 V | Establish connection |
| | **Attention! Change measuring range. Alternating voltage V ~** | | |
| | 3. Transformer is defective, no 110-V voltage is supplied to LP 15 | Measurement: (LP 15) St 16/3 approx. 114 V ~ | Replace power supply unit |
| | 4. Motor is defective | Measurement: (LP 15) St 16/4 and 1 Rest condition 110 V ~ | Replace motor |
| | 5. Power supply unit is defective | Measurement: (LP 15) St 16/4 and 1 When the key "Local" is depressed at pin 4: 110 V ~ to approx. 190 V ~ at pin 1: 110 V ~ to 0 V | Replace power supply unit |



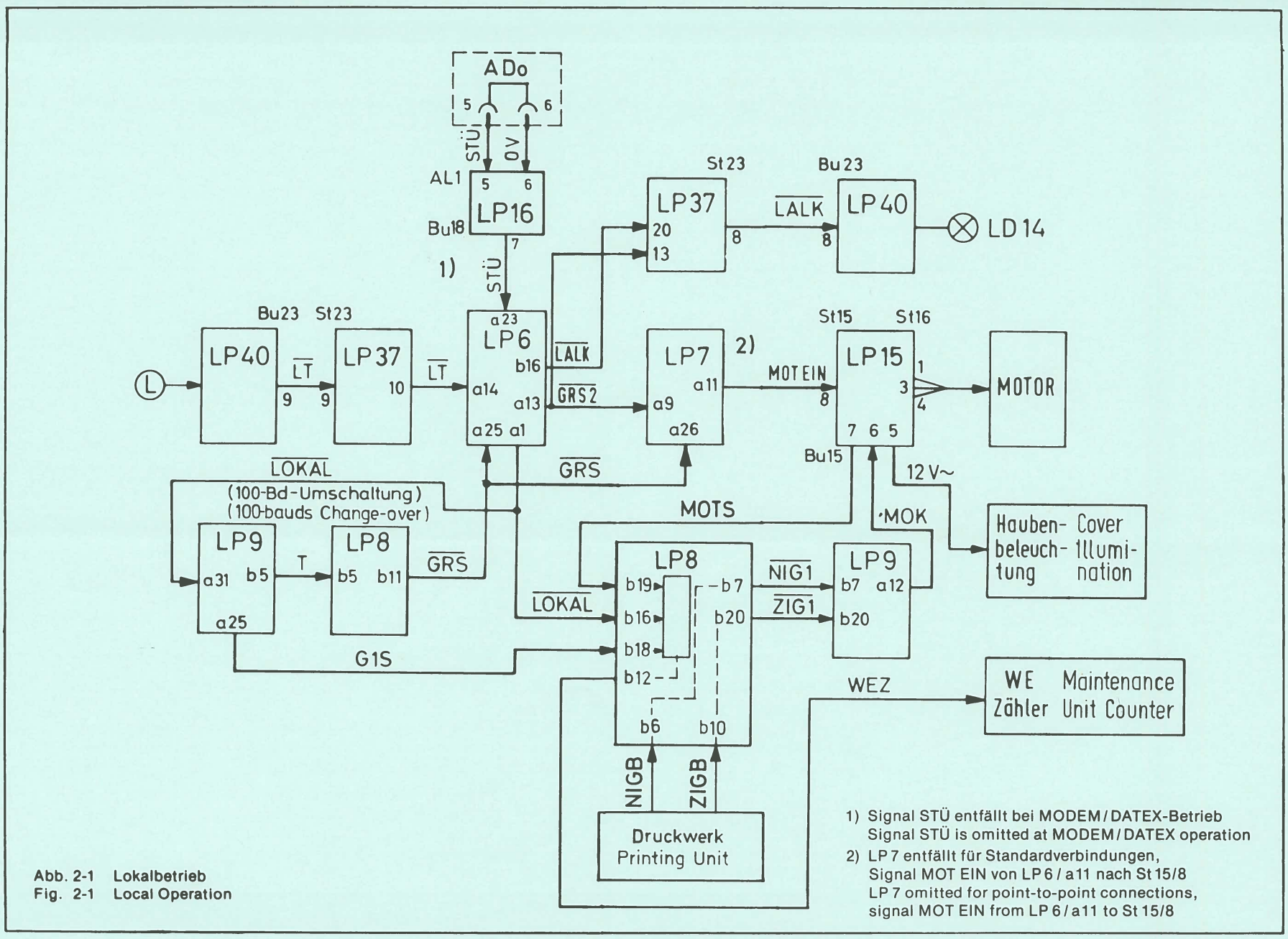

1) Signal STÜ entfällt bei MODEM/DATEX-Betrieb
Signal STÜ omitted at MODEM/DATEX operation

2) LP 7 entfällt für Standverbindungen,
Signal MOT EIN von LP 6/a11 nach St 15/8
LP 7 omitted for point-to-point connections,
signal MOT EIN from LP 6/a11 to St 15/8

**Abb. 2-1 Lokalbetrieb**
**Fig. 2-1 Local Operation**

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **10.2 Local Operation**<br>Depress local key (L) on the LO 2000 resp. on the DATEX subscriber unit | | | |
| 11.2 Motor starts only momentatily | Mechanical tightness of printing unit | Check type carrousel and paper guide (paper plate) | Replace printing unit resp. paper guide. If need be, bend the paper plate appropriately. (Attention! Check subsequently fuse Si1) |
| 12.2 Motor does not start. Indication "Local" (LD 14) does not light *(LD 14 inactive in DATEX operation)* | 1. Mains or line plug is pulled | Check mains or line plug | Establish mains or line connection |
| | 2. Power supply is interrupted | Check fuse of the connection arrangement | Replace fuse |
| | 3. Signal line M1 has wrong polarity | Measurement: LP 6/b8<br>Signal M1 —12 V | Check the lead to the MODEM resp. to the DATEX subscriber unit; establish correct polarity |
| | 4. Fuses on LP 15 are defective | Check all fuses on LP 15 | Replace defective fuses. Check subsequently voltages |
| | 5. Local key is defective | Measurement: Bu 23/9<br>Signal $\overline{LT}$ (+12 V to 0 V) | Replace LP 40 |
| | 6. Interruption between Bu 23/9 and LP 37/10 | Measurement: LP 37/10<br>Signal $\overline{LT}$ (+12 V to 0 V) | Replace LP 37 |
| | 7. Interruption between LP 37 and LP 6 (cable break) | Measurement: LP 6/a14<br>Signal $\overline{LT}$ | Establish connection |
| | 8. LP 9 is faulty, clock T = 307.2 kHz is not available | Measurement: LP 9/b5 (MP 4)<br>Signal T approx. +5 V | Replace LP 9 |
| | 9. Interruption between LP 9 and LP 8 | Measurement: LP 8/b5<br>Signal T approx. +5 V | Establish connection (LP 11) |
| | 10. LP 8 is faulty, signal $\overline{GRS}$ is not available | Measurement: LP 8/b11 (MP 1)<br>Signal $\overline{GRS}$ +12 V | Replace LP 8 |
| | 11. Interruption between LP 8 and LP 6 or LP 7 | Measurement: LP 6/a25 or LP 7/a26<br>Signal $\overline{GRS}$ +12 V | Establish connection (LP 11) |
| | *(Possible causes 5. to 7. are not valid for DATEX operation. In these cases check the connection to the DATEX subscriber unit)* | | |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 13.2 Motor does not start. Indication "Local" (LD 14) lights *(LD 14 inactive in DATEX operation)* | 1. Fuse Si 1 on LP 15 is defective | Check fuse | Replace fuse |
| | 2. LP 6 is faulty, signal $\overline{\text{GRS 2}}$ is not available | Measurement: LP 6 / a13<br>Signal $\overline{\text{GRS 2}}$ +12 V | Replace LP 6 |
| | 3. Interruption between LP 6 and LP 7 | Measurement: LP 7 / a9<br>Signal $\overline{\text{GRS 2}}$ | Establish connection (LP 11) |
| | 4. LP 7 is faulty, signal MOT EIN is not available | Measurement: LP 7 / a11<br>Signal MOT EIN +12 V | Replace LP 7 |
| | 5. Interruption between LP 7 and LP 15 | Measurement: (LP 15) St 15/8<br>Signal MOT EIN | Establish connection |
| | | **Attention! Change measuring range. Alternating voltage V ~** | |
| | 6. Transformer is defective, no 110-V voltage is supplied to LP 15 | Measurement: (LP 15) St 16/3<br>approx. 114 V ~ | Replace power supply unit |
| | 7. Motor is defective | Measurement: (LP 15) St 16/4 and 1<br>Rest condition 110 V ~ | Replace motor |
| | 8. Power supply unit is defective | Measurement: (LP 15) St 16/4 and 1<br>When the key "Local" is depressed<br>at pin 4: 110 V ~ to approx. 190 V ~<br>at pin 1: 110 V ~ to 0 V | Replace power supply unit |




1) Signal STÜ entfällt bei MODEM/DATEX-Betrieb
Signal STÜ is omitted at MODEM/DATEX operation

2) LP 7 entfällt für Standardverbindungen,
Signal MOT EIN von LP 6/a11 nach St 15/8
LP 7 omitted for point-to-point connections,
signal MOT EIN from LP 6/a11 to St 15/8

**Abb. 2-1 Lokalbetrieb**
**Fig. 2-1 Local Operation**

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **20 Line Operation**<br>Local operation is possible | | | |
| 21 Outgoing Call.<br>Depress the call key ⊙ ;<br>motor does not start | 1. Function key is defective | Measurement: LP 40/2<br>Signal $\overline{AT}$ (+12 V to 0 V) | Replace LP 40 |
| | 2. Interruption between LP 40 and LP 37 | Measurement: LP 37 Bu 23/7<br>Signal $\overline{AT}$ | Establish connection |
| | 3. LP 37 is faulty | Measurement: LP 37/9<br>Signal $\overline{AT}$ | Replace LP 37 |
| | 4. Interruption between LP 37 and LP 6 (cable break) | Measurement: LP 6 / b12<br>Signal $\overline{AT}$ | Establish connection |
| | 5. LP 6 is faulty or no paper is loaded (end-of-paper contact St 19) | Measurement: LP 6 / b8<br>Signal LS (—12 V to +12 V) | Replace LP 6 or load paper (plug in the end-of-paper contact St 19) |
| | - Signal LS is not available<br>- Signal D1 is not available | Measurement: LP 6 / b14<br>Signal D1 (+12 V to —12 V) | Replace LP 6 |
| | 6. LP 16 is faulty | Measurement: LP 16, strap 1-2<br>Signal D1 | Replace LP 16 |
| | 7. LP 12 (LAT) is faulty | Measurement: LP 16, strap 3-4<br>Signal D2 (+12 V → interruption 25 ms → +12 V, B-signaling)<br>Signal D2 (+12 V to —12 V, A-signaling) | Replace LP 12 |
| | 8. LP 16 is faulty or cable break | Measurement: LP 6 / a29<br>Signal D2 | Replace LP 16 or establish connection |
| | 9. LP 6 is faulty, signal $\overline{GRS\,2}$ is not available | Measurement: LP 6 / a13<br>Signal $\overline{GRS\,2}$ +12 V | Replace LP 6 |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 22 Teleprinter has started, LD 13 lights (in A-signaling systems LD 15). No automatic carriage return (CR) and line feed (LF) (CR-LF must be possible during local operation) | 1. LP 6 is faulty<br>Signal MOFF is not available | Measurement: LP 6 / b 19<br>Signal MOFF (+12 V to 0 V) | Replace LP 6 |
| | 2. Interruption between LP 6 and LP 7 | Measurement: LP 7 / b 18<br>Signal MOFF | Establish connection (LP 11) |
| | 3. LP 7 is faulty | Measurement:<br>- LP 7 / a 1<br>Signal WAA, approx. 4 ms measuring range 1 V. Clear deflection (approx. 0.15 V)<br>- LP 7 / b 15<br>Signal NLÜT, 4 pulses of 4 ms each between 2 zero pulses | Replace LP 7 |
| | 4. Interruption between LP 7 and LP 9 | Measurement:<br>- LP 9 / b 12<br>Signal WAA<br>- LP 9 / b 9<br>Signal NLÜT | Establish connection (LP 11) |
| | 5. LP 9 is faulty | Measurement:<br>- LP 9 / b 18<br>Signal CR ("0" to "1")<br>30 to 300 ms<br>- LP 9 / b 19<br>Signal LF ("0" to "1")<br>approx. 30 ms<br>- LP 9 / a 12<br>Signal MOK (0 V to +12 V) | Replace LP 9 |
| | 6. Interruption between LP 9 and LP 7 | Measurement:<br>- LP 7 / b 13<br>Signal MOK | Establish connection (LP 11) |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 23 Teleprinter starts, request-to-dial indication (LD 13) does not light *(in B-signaling systems only)* | 1. LP 6 is faulty | Measurement: LP 6 / b 11<br>Signal WA (0 V to +12 V) | Replace LP 6 |
| | 2. Interruption between LP 6 and LP 37 | Measurement: LP 37/27<br>Signal WA | Establish connection |
| | 3. Light-emitting diode 13 is defective | Measurement: Bu 23/6<br>+12 V not available | Replace LP 40 |
| | 4. LP 37 is faulty | Measurement: Bu 23/6<br>+12 V applied | Replace LP 37 |
| 24 No dial pulse generation. Character are however printed *(in B-signaling systems only)* | 1. LP 7 is faulty | Measurement: LP 7 / a 6<br>Signal WI ("0" to "1")<br>at the depression of figures key 1...0 | Replace LP 7 |
| | 2. Interruption between LP 7 and LP 6 | Measurement: LP 6 / a 2<br>Signal WI | Establish connection (LP 11) |
| | 3. LP 6 is faulty | Measurement: LP 6 / b 14<br>Signal D1 (—12 V to +12 V)<br>after depression of a figures key | Replace LP 6 |
| | 4. +5 V are missing | Measurement: LP 15 Bu 15/12<br>(+5 V) | Replace Power supply unit, F 01<br>or LP 15, A 02 |
| 25 Upon completion of the dial operation no "start transmission" request. (Incoming seizure is not possible either) *(in B-signaling systems only)* | 1. LP 12 is faulty | Measurement: LP 6 / a 28<br>Signal LP (—12 V to +12 V) | Replace LP 12 |
| | 2. LP 6 is faulty | Measurement:<br>- LP 6 / a 28<br>Signal LP<br>- LP 6 / b 15<br>Signal $\overline{\text{LAEN}}$ (+12 V to 0 V) | Replace LP 6 |
| 26 Faulty selection (No interdialling terms) *(in B-signaling systems only)* | 1. Full +5 V not applied | Measurement: LP 15 Bu 15/12<br>(+5 V) | Replace Power supply unit, F 01<br>or LP 15, A 02 |

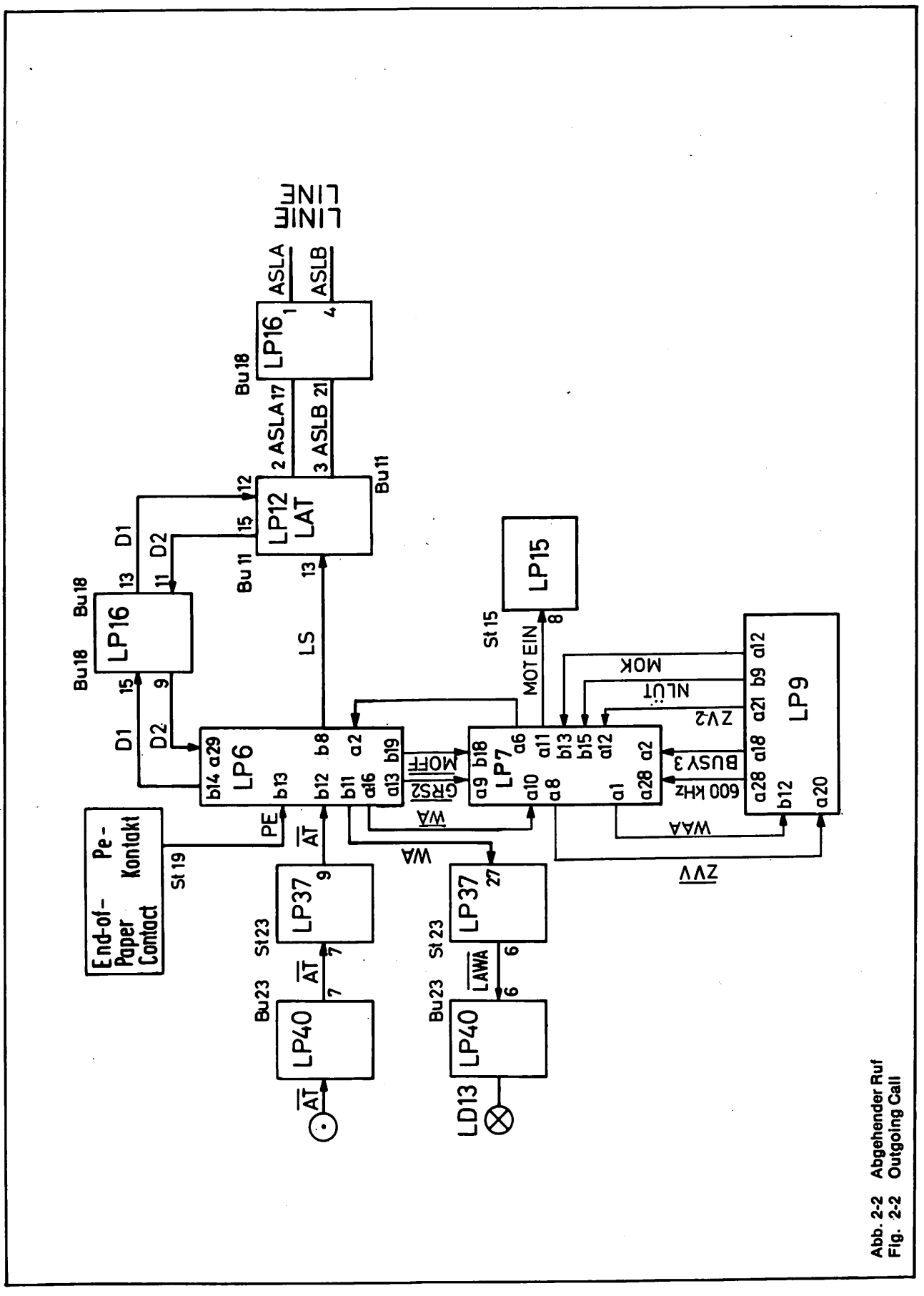



Abb. 2-2 Abgehender Ruf
Fig. 2-2 Outgoing Call

**POINT-TO-POINT CONNECTION**

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **20.1 Line Operation**<br>LP 22 (motor switch) is plugged in, strap 2 must be inserted.<br>Local operation is possible | | | |
| 21.1 Outgoing Call.<br>Depress the call key ⊙, motor does not start | 1. Function key is defective | Measurement: LP 40/2<br>Signal $\overline{AT}$ (+12 V to 0 V) | Replace LP 40 |
| | 2. Interruption between LP 40 and LP 37 | Measurement: LP 37 Bu 23/7<br>Signal $\overline{AT}$ | Establish connection |
| | 3. LP 37 is faulty | Measurement: LP 37/9<br>Signal $\overline{AT}$ | Replace LP 37 |
| | 4. Interruption between LP 37 and LP 6 (cable break) | Measurement: LP 6 / b12<br>Signal $\overline{AT}$ | Establish connection |
| | 5. LP 6 is faulty<br>Signal ED is not available | Measurement: LP 6 / a12<br>Signal ED visible change to "1" (measuring range 3 V to 10 V) | Replace LP 6 |
| | 6. Interruption between LP 6 and LP 15 | Measurement: (LP 15) St 15/10<br>Signal ED | Establish connection |
| | 7. LP 15 is faulty | Measurement: (LP 15) Bu 27/2<br>Signal ED | Replace LP 15 |
| | 8. LP 22 is faulty | Measurement: (LP 22) St 27/5<br>level change from 0 V to approx. 8 V to 0 V (measuring range 10 V) | Replace LP 22<br>(Strap 2 must be inserted) |

**POINT-TO-POINT CONNECTION**

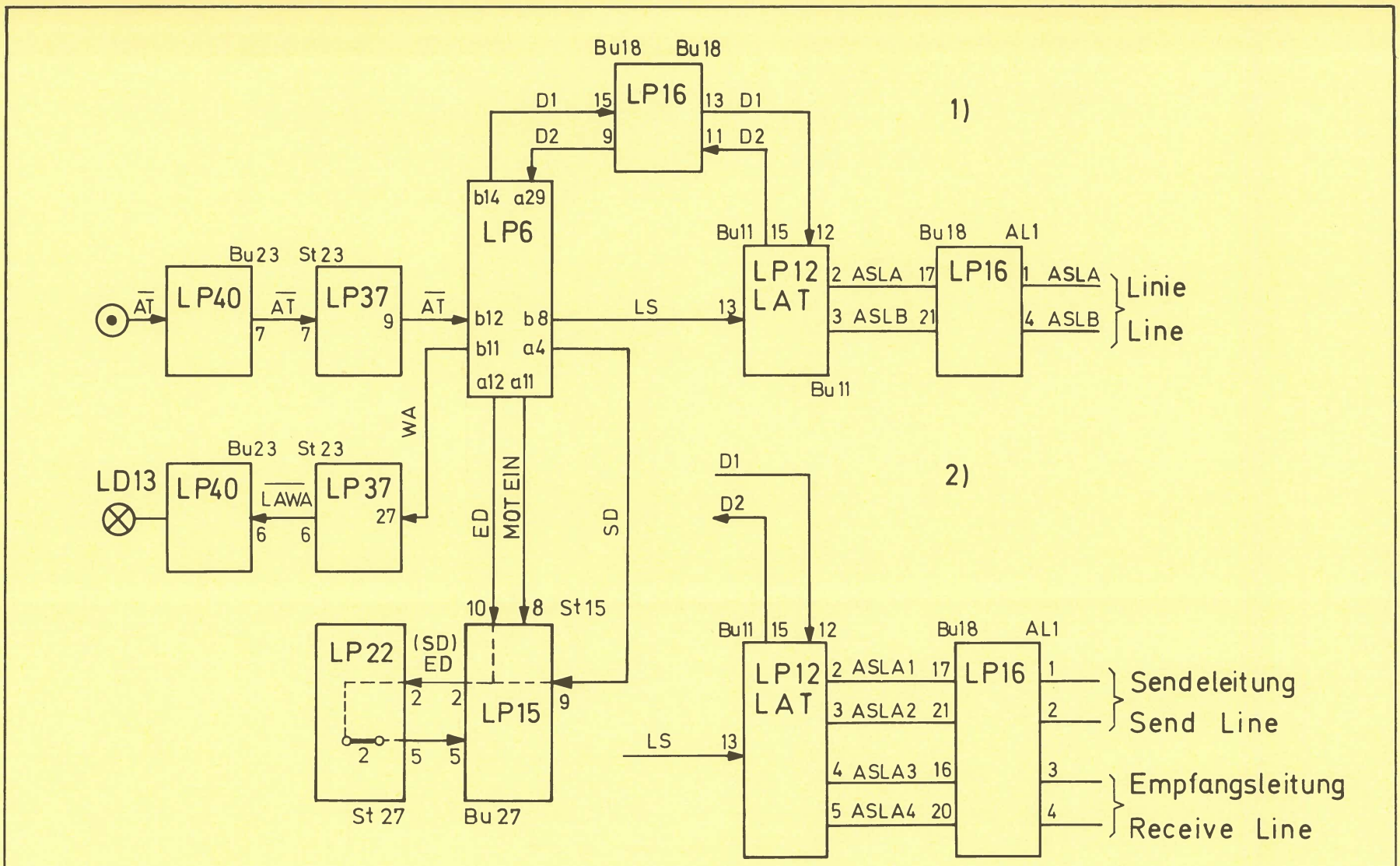
| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 22.1 Teleprinter starts, indication "Motor On" (LD 13) does not light | 1. LP 6 is faulty | Measurement: LP 6 / b11<br>Signal WA (0 V to + 12 V) | Replace LP 6 |
| | 2. Interruption between LP 6 and LP 37 | Measurement: LP 37/27<br>Signal WA | Establish connection |
| | 3. Light-emitting diode 13 is defective | Measurement: Bu 23/6<br>+ 12 V not available | Replace LP 40 |
| | 4. LP 37 is faulty | Measurement: Bu 23/6<br>+ 12 V applied | Replace LP 37 |
| 23.1 Teleprinter starts and is switched off after motor-switch delay time.<br>Sending data are transmitted *(only in full-duplex operation)* | Sending data are not available on the motor switch: | | |
| | 1. Interruption between LP 6 and LP 15 | Measurement: St 15/9<br>Signal SD<br>visible change to "1"<br>(measuring range 3 V to 10 V) | Establish connection |
| | 2. LP 15 is faulty | Measurement: (LP 15) Bu 27/2<br>Signal SD | Replace LP 15 |
| | 3. LP 22 is faulty | | Replace LP 22<br>(Strap 2 must be inserted) |
| 24.1 Teleprinter starts and no characters on line | 1. LP 6 is faulty<br>Signal D1 is not available | Measurement: LP 6 / b14<br>Signal D1 (—12 V to + 12 V) | Replace LP 6 |
| | 2. Interruption between LP 6 and LP 16 (cable break) | Measurement: Bu 18/15<br>Signal D1 | Establish connection |
| | 3. LP 16 is faulty | Measurement: LP 16, strap 1-2<br>Signal D1 | Replace LP 16 |

**POINT-TO-POINT CONNECTION**

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 24.1 continued | 4. Interruption between LP 16 and LP 12 (LAT) | Measurement: LP 12/12<br>Signal D1 | Establish connection |
| | 5. LP 12 (LAT) is faulty | Change LAT.<br>If the fault is eliminated: | Replace LP 12 (LAT) |
| | 6. LP 16 is faulty<br>(ASL shorted circuits) | Visible check and/or<br>change LP 16.<br>If the fault is eliminated: | Replace LP 16 |
| 25.1 Teleprinter starts, but not line current<br>*(line monitoring not established)* | 1. LP 6 is faulty<br>Signal D1 is permanent +12 V | Measurement: LP 6/b14<br>Signal D1 (—12 V to +12 V) | Replace LP 6 |
| | 2. LP 12 (LAT) is faulty | Change LAT.<br>If the fault is eliminated: | Replace LP 12 (LAT) |
| | 3. LP 16 is faulty<br>(ASL is interrupted) | Visible check and/or changing LP 16.<br>If fault is eliminated: | Replace LP 16 |
| 26.1 Teleprinter starts, but line current is permanently low | 1. LP 6 is faulty<br>Signal LS is permanent —12 V | Measurement: LP 6/b8<br>Signal LS +12 V | Replace LP 6 |
| | 2. Interruption between LP 6 and LP 12 (LAT) | Measurement: LP 12/13<br>Signal LS | Establish connection |
| | 3. LP 12 (LAT) is faulty | Change LAT.<br>If the fault is eliminated: | Replace LP 12 (LAT) |

**POINT-TO-POINT CONNECTION (likewise RECEIVE-ONLY OPERATION)**

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 27.1 Incoming Call.<br>Teleprinter does not start | 1. LP 12 (LAT) is faulty<br>Signal D2 is not available | Measurement: LP 16, strap 3-4<br>Signal D2 (—12 V to +12 V) | Replace LP 12 |
| | 2. LP 16 is faulty or cable break | Measurement: LP 6 / a29<br>Signal D2 | Replace LP 16 or establish connection |
| | 3. LP 6 is faulty<br>Signal ED is not available | Measurement: LP 6 / a12<br>Signal ED<br>visible change to 1"<br>(measuring range 1 V) | Replace LP 6 |
| | 4. Interruption between LP 6 and LP 15 | Measurement: (LP 15) St 15/10<br>Signal ED | Establish connection |
| | 5. LP 15 is faulty | Measurement: (LP 15) Bu 27/2<br>Signal ED | Replace LP 15 |
| | 6. LP 22 is faulty | Measurement: (LP 22) St 27/5<br>level change from 0 V to approx. +8 V to 0 V (measuring range 10 V) | Replace LP 22<br>(Strap 2 must be inserted) |




1) Zweidraht-Einfachstrom
Two wire single current (neutral operation)

2) Vierdraht Einfachstrom / Doppelstrom
Four wire single current (neutral operation) / double current (polar operation)

Abb. 2-2.2 Abgehender Ruf (Standverbindung)
Fig. 2-2.2 Outgoing Call (Point-to-Point Connection)

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **20.2 Line Operation**<br>Local operation is possible | | | |
| 21.2 Outgoing Call.<br>Depress the call key (⊙)<br>*(for MODEM connection by means of telephone without data key)*<br>*resp.*<br>depress the data key<br>*(for MODEM connection by means of telephone with data key)*<br>*resp.*<br>depress the call key on the DATEX subscriber unit.<br><br>Motor does not start | 1. Function key is defective | Measurement: LP 40/2<br>Signal $\overline{AT}$ (+12 V to 0 V) | Replace LP 40 |
| | 2. Interruption between LP 40 and LP 37 | Measurement: LP 37 Bu 23/7<br>Signal $\overline{AT}$ | Establish connection |
| | 3. LP 37 is faulty | Measurement: LP 37/9<br>Signal $\overline{AT}$ | Replace LP 37 |
| | 4. Interruption between LP 37 and LP 6 (cable break) | Measurement: LP 6/b12<br>Signal $\overline{AT}$ | Establish connection |
| | 5. LP 6 is faulty or no paper is loaded (end-of-paper contact St 19) | Measurement: LP 6/b8<br>Signal S1 (—12 V to +12 V)<br>if telephone *without* data key | Replace LP 6 or load paper (plug in the end-of-paper contact St 19) |
| | Signal S1 not available | Signal S1 (+12 V)<br>if telephone *with* data key<br>resp. DATEX operation | |
| | 6. Signal M1 not available | Measurement: LP 6/b8<br>Signal M1 (—12 V to +12 V) | Establish connection to the MODEM resp. to the DATEX subscriber unit |
| | *Possible causes 1... 4 are only valid for MODEM operation with telephone without data key.*<br>*In case of MODEM operation with dataphone resp. DATEX operation check and establish the connection to the data phone resp. DATEX subscriber unit* | | |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 21.2 continued | 7. LP 6 is faulty<br>Signal GRS 2 is not available<br>*(only for MODEM operation with telephone without data key)* | Measurement: LP 6/a13<br>Signal GRS 2 +12 V | Replace LP 6 |
| 22.2 Teleprinter starts. Indication "Data set ready" (LD 13) does not light<br>*(only for MODEM operation)* | 1. LP 6 is faulty<br>2. Interruption between LP 6 and LP 37<br>3. Light-emitting diode 13 is defective<br>4. LP 37 is faulty | Measurement: LP 6/b11<br>Signal WA (0 V to +12 V)<br>Measurement: LP 37/27<br>Signal WA<br>Measurement: Bu 23/6<br>+12 V not available<br>Measurement: Bu 23/6<br>+12 V applied | Replace LP 6<br>Establish connection<br>Replace LP 40<br>Replace LP 37 |
| 23.2 Teleprinter has started. LD 13 lights *(only for MODEM operation).*<br>Sending is not possible. Indication "Ready for sending" (LD 15) behind the clear key ⊙ does not light.<br>Receiving is likewise not possible | 1. Signals M5 and M2 are not available<br>2. LP 6 is faulty | Measurement:<br>— LP 6/a30<br>Signal M5 (—12 V to +12 V)<br>— LP 6/a28<br>Signal M2 (—12 V to +12 V)<br>Measurement:<br>— LP 6/b14<br>Signal D1 (—12 V to +12 V)<br>— LP 6/a29<br>Signal D2 (—12 V to +12 V) | Establish connection to the MODEM resp. to the DATEX subscriber unit<br>Replace LP 6 |

**V. 24/28 MODEM/DATEX**

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 24.2 Teleprinter has started. Sending and receiving operation are possible. Indication LD 15 does not light | 1. LP 6 is faulty | Measurement: LP 6/b15<br>Signal $\overline{\text{LAS}}$ (+12 V to 0 V) | Replace LP 6 |
| | 2. Interruption between LP 6 and LP 37 | Measurement: LP 37/19<br>Signal $\overline{\text{LAS}}$ ($\hat{=}$ $\overline{\text{LAEN}}$) | Establish connection |
| | 3. Light-emitting diode 15 is defective | Measurement: Bu 23/10<br>+12 V not available | Replace LP 40 |
| | 4. LP 37 is faulty | Measurement: Bu 23/10<br>+12 V applied | Replace LP 37 |
| 25.2 Incoming Call. Teleprinter starts only momentarily and switches off automatically after approx. 10 s *(only if the MODEM is working in the "automatic connection" mode of operation)* | The callers's telephone does not operate conjointly with a MODEM. Signals M5 and M2 are not available | Measurement:<br>— LP 6/a30<br>Signal M5 (—12 V to +12 V)<br>— LP 6/a28<br>Signal M2 (—12 V to +12 V) | Establish connection |

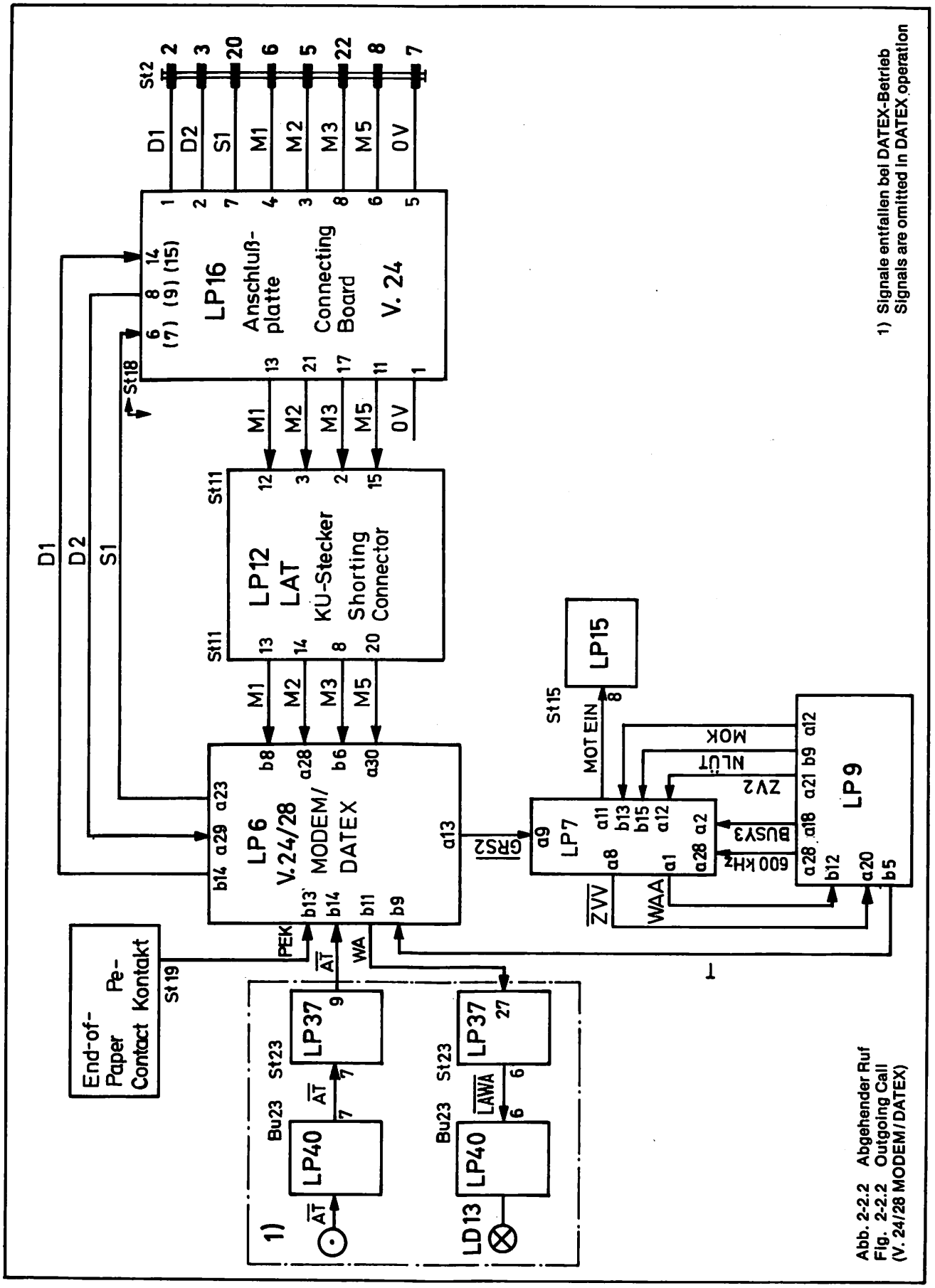



Abb. 2-2.2 Abgehender Ruf
Fig. 2-2.2 Outgoing Call
(V. 24/28 MODEM/DATEX)

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **30 Carriage Return** | | | |
| 31 After depression of the key [<] or key [↵] no carriage return is effected. All other keys bring the correct functions | 1. LP 9 is faulty | Measurement: LP 9 / b18 Signal CR 30 to 300 ms measuring range 1V, clear deflection | Replace LP 9 |
| | 2. Interruption between LP 9 and LP 8 | Measurement: LP 8 / a24 Signal CR | Establish connection (LP 11) |
| | 3. Fuse Si 3 on LP 15 is defective | Check fuse | Replace fuse |
| | 4. LP 8 is faulty | Measurement: LP 8 / a31 Signal $\overline{KLM}$, approx. 30 ms (momentarily changing from +40 V to 0 V) | Replace LP 8 |
| | 5. Interruption between LP 8 and feed pawl electromagnet | Measurement: LP 8 / a31 +40 V not available in the rest condition | Establish connection |
| | 6. Plug-in connection to the feed pawl electromagnet is disengaged. | Check the plug-in connection | Establish the plug-in connection |
| | Feed pawl electromagnet is defective | Measurement: LP 8 / a31 Signal $\overline{KLM}$ | Replace feed pawl electromagnet |
| 32 After depression of the key [<] the printing unit fails to reach the start-of-line position | 1. Soldered joint start-of-line switch E1 is disengaged | Check soldered joint | Establish soldered joint |
| | 2. Start-of-line switch E1 is defective | Check the start-of-line switch E1 | Replace the start-of-line switch E1 |
| 33 After carriage return no printing operation is possible | 1. Start-of-line switch E1 is defective | Measurement: LP 9 / b14 Signal E1 L (0 V to +12 V) | Adjust or replace the start-of-line switch E1 |
| | 2. Interruption between start-of-line switch E1 and LP 9 | Check the connection | Establish connection |
| 34 Lost characters during carriage return | 1. LP 9 is faulty | Measurement: LP 9 / a18 (MP 2) Signal BUSY 3 is not admitted to be applied during carriage return | Replace LP 9 |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **40 Carriage Drive** | | | |
| 41 Carriage drive is not carried out.<br>The acuted keys print the correct character | 1. LP 9 is faulty | Measurement: LP 9 / a1<br>Signal $\overline{TM}$, approx. 90 ms at "space" or "repeat" (+12 V to 0 V) | Replace LP 9 |
| | 2. Interruption between LP 9 and LP 8 | Measurement: LP 8 / a22<br>Signal $\overline{TMI}$ ≙ LP 9 / a1 Signal $\overline{TM}$ | Establish connection (LP 11) |
| | 3. Plug-in connection to the feed electromagnet is disengaged | Check the plug-in connection | Establish plug-in connection |
| | Feed electromagnet is defective | Resistance measurement between LP 8 / a28 and a20 (approx. 20 ohms) | Replace the feed electromagnet |
| | 4. LP 8 is faulty | Resistance measurement according to test step (3) is o. k. | Replace LP 8 |
| 42 Carriage drive is faulty in the last third.<br>Characters are printed one upon another for a time | 1. Feed gear | — | Replace feed gear |
| 43 Carriage drive is carried out beyond the 69th (72nd) character | 1. End-of-line switch E2 is defective (soldered joint) | Measurement: LP 9 / b16<br>Signal E2R (+12 V)<br>(check soldered joint) | Adjust end-of-line switch E2.<br>Replace it if it is defective (establish soldered joint) |
| | 2. LP 9 is faulty | Measurement: LP 9 / a1<br>Signal $\overline{TM}$ in rest condition +12 V | Replace LP 9 |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **50 Paper Feed** | | | |
| 51 Paper feed is not carried out | 1. Paper release lever is in a wrong position | Check paper release lever | Shift paper release lever to the correct position |
| 52 Line feed is not carried out | 1. LP 9 is faulty | Measurement: LP 9 / b19<br>Signal LF, approx. 30 ms at "line feed" and "repeat" (0 V to +12 V) | Replace LP 9 |
| | 2. Interruption between LP 9 and LP 8 | Measurement: LP 8 / a29<br>Signal LF | Establish connection (LP 11) |
| | 3. Fuse Si 3 on LP 15 is defective | Measurement: LP 8 / a30<br>Rest condition +40 V.<br>+40 V not available, check fuse | Replace fuse |
| | 4. Plug-in connection to the line feed magnet is disengaged | Measurement: as above | Establish plug-in connection |
| | Line feed magnet is defective | | Replace line feed magnet |
| | 5. LP 8 is faulty | Measurement: LP 8 / a30<br>Signal $\overline{\text{LFM}}$ at "line feed" and "repeat" (+40 V to 0 V) | Replace LP 8 |
| 53 Permanent line feed and simultaneous energizing of the feed electromagnet<br>*(not applied to point-to-point operation)* | 1. LP 7 is faulty.<br>Signal WAA permanently present | Measurement: LP 7 / a1<br>(see fault 22, possible cause 3.) | Replace LP 7 |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **60 Repeat Key [....] or Continual Printing** | | | |
| 61 After depression of a key the character is continually printed | 1. Light barrier is defective | Measurement: LP 32 / photo-transistor 21 emitter (yellow wire) Rest condition (measuring range 10 V): approx. +1.5 V | Replace light barrier (LP 32 + LP 33) |
| | 2. LP 37 is faulty | — | Replace LP 37 |
| 62 Depression of the key [....] does not result in the printing of the character selected last | 1. LP 37 is faulty | Measurement: Signal $\overline{DAT}$ (from "1" to "0") | Replace LP 37 |
| | 2. Light barrier is defective | LP 32 / phototransistor 21 emitter (yellow wire) | Replace light barrier (LP 32 + LP 33) |
| 63 The indication "keyboard lock" does not light with the repeat key depressed | 1. LP 37 is faulty | Measurement: LP 37 St 22/5 Signal $\overline{LATSP}$ (+12 V to 0 V) | Replace LP 37 |
| | 2. Interruption between LP 37 and LP 40 | Measurement: LP 40/13 Signal $\overline{LATSP}$ | Establish connection |
| | 3. LP 40 is defective | — | Replace LP 40 |
| **70 Erratic Functions at the actuation of the "sequential character" keys (e. g. ä, ö, ü, CRLF [New Line])** | 1. LP 37 is faulty | — | Replace LP 37 |
| | 2. Laminated spring in the key element is disengaged | — | Engage the laminated spring in the key element |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **80 Printing** | | | |
| 81 All keys fail to produce any printing action. Receive operation is possible | 1. LP 9 resp. LP 10 is faulty | Measurement: LP 9 / a11 resp. LP 10 / a11<br>Signal G192 (19.2-kHz clock)<br>≙TMOK approx. 5 V ⎍⎍⎍ | Replace LP 9 resp. LP 10 |
| | 2. Interruption between LP 9 and LP 37 | Measurement: LP 37/15<br>Signal G192 | Establish connection |
| | 3. LP 37 is faulty | — | Replace LP 37 |
| | 4. LP 33 is faulty | Check the connection from LP 15 to LP 33<br>Measurement: LP 33/2<br>+30 V | Establish connection from LP 15 to LP 33<br>Replace light barrier (LP 32 + LP 33) |
| 82 Individual keys fail to produce any printing action. The indication DOE lights. Receive operation is possible | 1. Laminated spring in the key element is disengaged | — | Engage the laminated spring in the key element |
| | 2. LP 33 or LP 32 is defective | — | Replace light barrier (LP 32 + LP 33) |
| | 3. LP 37 is faulty | — | Replace LP 37 |
| 83 The indication DOE (LD 8) lights permanently. No printing operation | 1. Color ribbon solenoid, pawl feed magnet or selection station is defective | Measurement: Values of resistances of the magnets see Block Diagram | Replace defective magnet |
| | 2. Light barrier is defective | Measurement: LP 33/1 +40 V | Replace light barrier (LP 32 + LP 33) |
| 84 No printing action. The indication DOE (LD 8) does not light. Receive operation is possible | 1. LP 37 is faulty | Measurement: LP 37/7<br>Signal $\overline{SD}$ with the repeat key depressed visible change to "1" (measuring range 3 V to 10 V) | Replace LP 37 |
| | 2. Interruption between LP 37 and LP 6 | Measurement: LP 6 / a4<br>Signal $\overline{SD}$ | Establish connection |
| | 3. LP 6 is faulty | Measurement: LP 6 / a12<br>Signal $\overline{ED}$<br>with the repeat key depressed visible change to "1" (measuring range 3 V to 10 V) | Replace LP 6 |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 85 Neither receive operation nor transmit operation is possible<br><br>*(If V. 24/28 MODEM/DATEX operation, signals M5 and M2 must be present, see fault step 23.2.)* | 1. LP 6 is faulty | Measurement: LP 6 / a12<br>Signal $\overline{ED}$<br>with the repeat key depressed visible change to "1"<br>(measuring range 3 V to 10 V) | Replace LP 6 |
| | 2. Interruption between LP 6 and LP 9 resp. LP 10 | Measurement: LP 9 / a26 resp. LP 10 / a26<br>Signal $\overline{ED}$ | Establish connection |
| | 3. Plug "zero pulse generator" or "counting pulse generator" is pulled | Check the plug-in connections | Establish plug-in connections |
| | 4. LP 9 is faulty | — | Replace LP 9 |
| | 5. LP 10 is faulty | — | Replace LP 10 |
| | 6. LP 8 is faulty | — | Replace LP 8 |
| | 7. Printing unit is defective (zero pulse generator, counting pulse generator, selection station) | — | Replace printing unit |
| 86 During transmit operation "Break-in" recognition without a call from the remote subscriber | 1. LP 12 is faulty | — | Replace LP 12 |
| 87 Sporadic printing in wrong ribbon color | 1. Color ribbon solenoids are defective | Measuring: LP 8 / a10, LP 8 / a2<br>In rest condition +12 V | Replace the defective color ribbon solenoid |
| 88 Wrong characters are printed out at the depression of the keys | A type has gone loose from the type bar | Check type-carrier carrousel | Replace type bar |

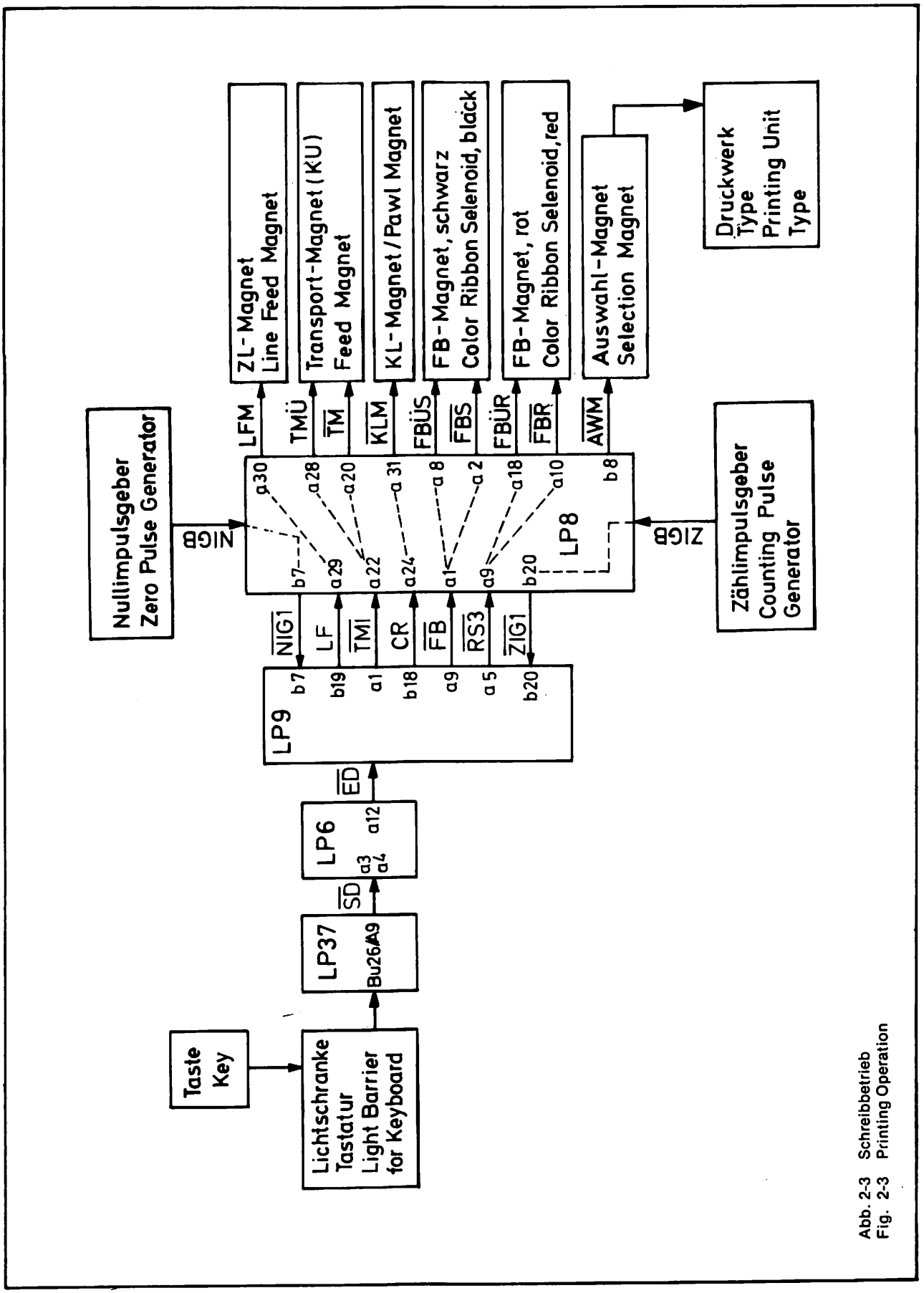


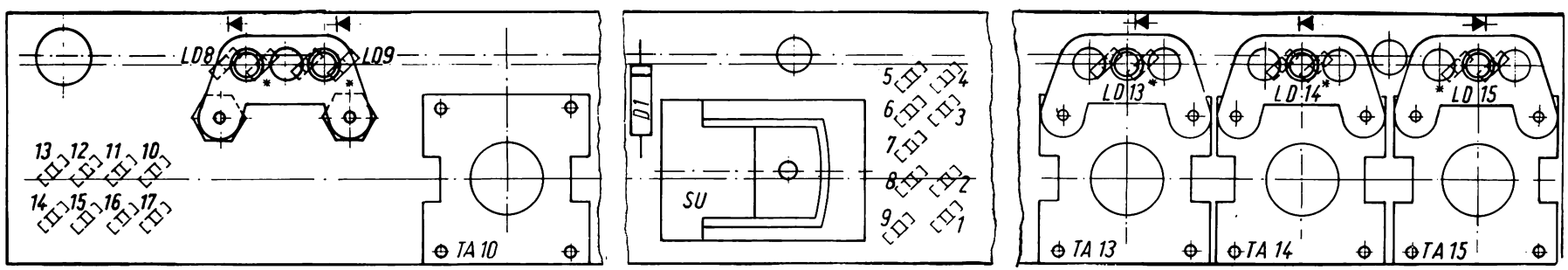

Abb. 2-3 Schreibbetrieb
Fig. 2-3 Printing Operation

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **90 Color Ribbon Feed Mechanism** | | | |
| 91 The color ribbon is not shifted to the transmit position during transmission | 1. Plug-in connection at the right-hand color ribbon solenoid is disengaged | Check plug-in connection | Establish plug-in connection |
| | 2. Interruption between LP 37 and LP 9 | Measurement: LP 9 / a27<br>Signal $\overline{SD}$<br>with the repeat key depressed<br>visible change to "1"<br>(measuring range 3 V to 10 V) | Establish connection |
| | 3. LP 9 is faulty | Measurement: LP 9 / a9<br>Signal $\overline{FB}$ (+12 V to 0 V) | Replace LP 9 |
| | 4. Interruption between LP 9 and LP 8 | Measurement: LP 8 / a1<br>Signal $\overline{FB}$ | Establish connection (LP 11) |
| | 5. Right-hand color ribbon solenoid is defective | Measurement: LP 8 / a2<br>Rest condition $\overline{FBS}$ +12 V | Replace right-hand color ribbon solenoid |
| | 6. LP 8 is faulty | Measurement: LP 8 / a2<br>Signal $\overline{FBS}$ (+12 V to 0 V) | Replace LP 8 |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 92 Printing during receive operation in a wrong color | 1. Plug-in connection at the right-hand or left-hand color ribbon solenoid is disengaged | Check plug-in connection | Establish plug-in connection |
| | 2. Interruption between LP 6 and LP 10 | Measurement: LP 10 / a26<br>Signal $\overline{ED}$<br>with repeat key depressed visible change to "1"<br>(measuring range 3 V to 10 V) | Establish connection |
| | 3. LP 10 is faulty | Measurement: LP 10 / b8<br>Signal RS 2 ("0" to "1" momentarily) | Replace LP 10 |
| | 4. Interruption between LP 10 and LP 9 | Measurement: LP 9 / b8<br>Signal RS2 | Establish connection |
| | 5. LP 9 is faulty | 1. Measurement: LP 9 / a9<br>Signal $\overline{FB}$ (+12 V to 0 V)<br>2. Measurement: LP 9 / a5<br>Signal $\overline{RS3}$ (+12 V to 0 V) | Replace LP 9 |
| | 6. Interruption between LP 9 and LP 8 | 1. Measurement: LP 8 / a1<br>Signal $\overline{FB}$<br>2. Measurement: LP 8 / a9<br>Signal $\overline{RS3}$ | Establish connection (LP 11) |
| | 7. Right-hand or left-hand color ribbon solenoid is defective | Measurement: LP 8 / a2<br>LP 8 / a10<br>Rest condition $\overline{FBS}$, $\overline{FBR}$ +12 V | Replace right-hand or left-hand color ribbon solenoid |
| | 8. LP 8 is faulty | 1. Measurement: LP 8 / a2<br>Signal $\overline{FBS}$ (+12 V to 0 V)<br>2. Measurement: LP 8 / a10<br>Signal $\overline{FBR}$ (+12 V to 0 V) | Replace LP 8 |
| | 9. Setting of the pawl is not correct | | Replace color ribbon feed mechanism |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| 93 Black-red position interchanged | Color ribbon feed mechanism is not correctly mounted | Check the mounting (eccentric) | During the mounting of the color ribbon feed mechanism regard eccentric |
| 94 The color ribbon is not advanced at a steady rate | 1. Sensing lever is not engaged with the feed lever | Check | Bring the sensing lever in engagement with the feed lever |
| | 2. Tension spring on the feed lever or on the feed pawl is disengaged or broken | Check | Engage the tension spring or replace it |
| | 3. The color ribbon cartridge is defective | Check | Replace the color ribbon cartridge |
| | 4. The color ribbon feed mechanism is defective | Check | Replace the color ribbon feed mechanism |

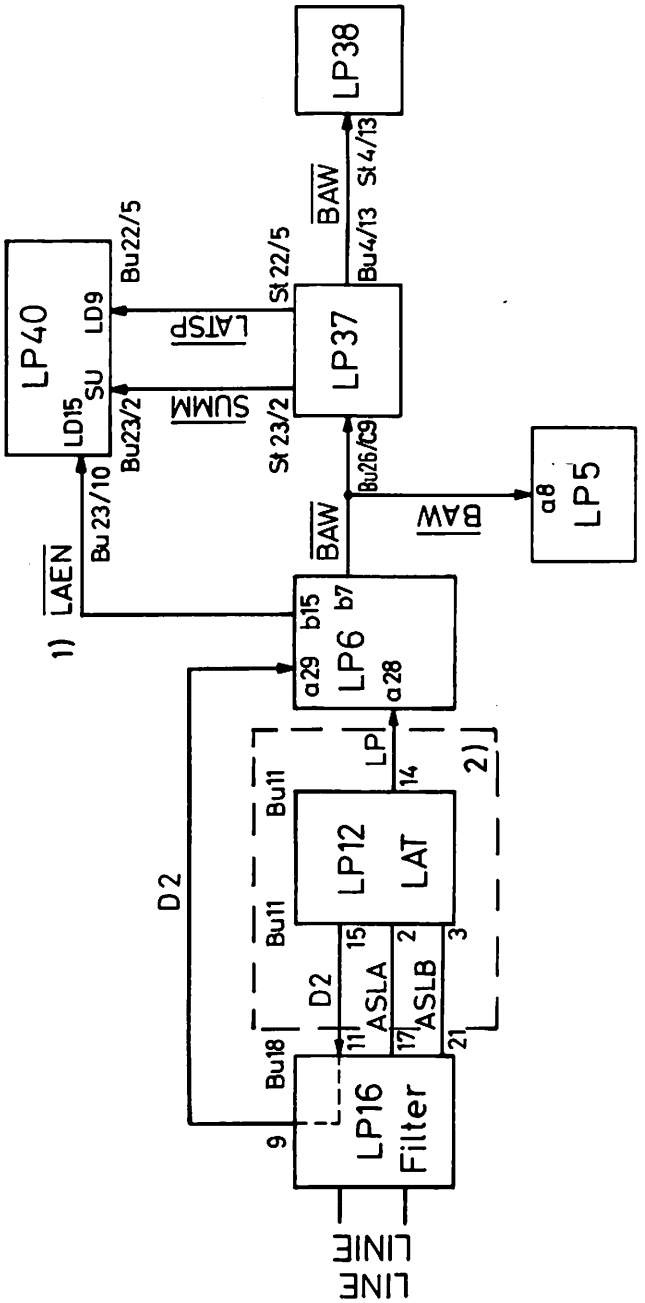
| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **100 Buzzer** | | | |
| 101 The buzzer does not sound 10 characters ahead of the line end, and printing is continued after line end. (Line end is dependent on inserted straps, see section 4-LP 37) | LP 37 is faulty | — | Replace LP 37 |
| 102 No audible signaling | 1. Buzzer is defective | — | Replace LP 40 |
| | 2. Interruption between LP 37 and LP 40 | Measurement: LP 40/9<br>Signal $\overline{\text{SUMM}}$ (+12 V to 0 V) | Establish connection |
| | 3. LP 37 is faulty | Measurement: St 23/2<br>Signal $\overline{\text{SUMM}}$ | Replace LP 37 |
| 103 At the switching-on of the teleprinter the buzzer is continuously sounded. No carriage drive takes place | 1. Soldered joint end-of-line switch E 2 is disengaged | Check soldered joint | Establish soldered joint |
| | 2. E 2 is defective | Check end-of-line switch E 2 | Replace end-of-line switch E 2 |




LP 40 Partial view — seen from the top

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **110 Change of Operation Mode**[1])<br>Tape reader and tape punch* are not disconnected at the mode change<br>* (if tape punch is switched on via "Tape Punch On" key) | | | |
| 111 The buzzer does not sound, the indication "keyboard lock" (LD 9) does not light | 1. LP 6 is faulty | Measurement: LP 6 / b 7<br>Signal $\overline{\text{BAW}}$ (+12 V to 0 V to +12 V)<br>approx. 0.3 s to 2.9 s<br>dependent on inserted straps,<br>see section 4-LP 6 | Replace LP 6 |
| | 2. Interruption between LP 6 and LP 37 | Measurement: LP 37/26<br>Signal $\overline{\text{BAW}}$ | Establish connection |
| | 3. LP 37 is faulty | Measurement: LP 37 Bu 4/13<br>Signal $\overline{\text{BAW}}$ | Replace LP 37 |
| | 4. Buzzer is defective | — | Replace LP 40 |
| 112 The buzzer sounds momentarily, the indication "keyboard lock" (LD 9) is momentarily lighted | 1. Interruption between LP 37 and LP 38 | Measurement: LP 38/12<br>Signal $\overline{\text{BAW}}$ | Replace connection |
| | 2. LP 38 is faulty | — | Replace LP 38 |
| | 3. Interruption between LP 6 and LP 5 | Measurement: LP 5 / a 8<br>Signal $\overline{\text{BAW}}$ | Establish connection (LP 11) |
| | 4. LP 5 is faulty | — | Replace LP 5 |

[1]) Not applied to V. 24/28 MODEM operation




1) $\overline{\text{LAEN}}$ (V. 24/28 MODEM/DATEX: $\overline{\text{LAS}}$)
entfällt bei Standverbindungen
omitted at point-to-point connections

2) Signale entfallen bei V. 24/28 MODEM/DATEX
Signals are omitted at V. 24/28 MODEM/DATEX

Abb. 2-4 Betriebsartenwechsel
Fig. 2-4 Change of Operation Mode

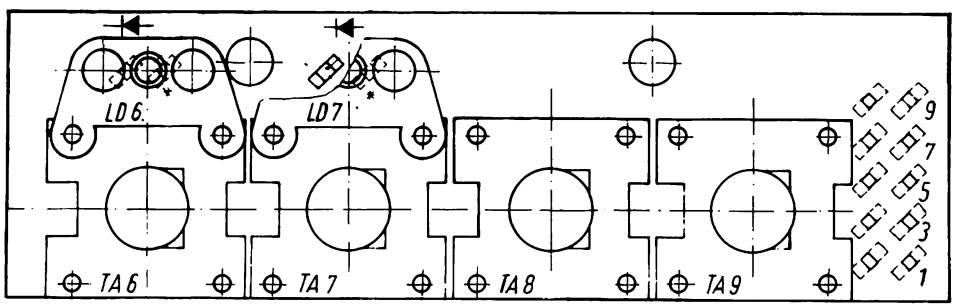
| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **120 Answer-back Unit** | | | |
| 121 Depression of the answer-back key (◇) fails to start the answer-back unit | 1. Answer-back key is defective | Measurement: LP 40/15<br>Signal $\overline{\text{TAKG 1}}$ (+12 V to 0 V) | Replace LP 40 |
| | 2. Interruption between LP 40 and LP 37 | Measurement: LP 37 St 22/7<br>Signal $\overline{\text{TAKG 1}}$ | Establish connection |
| | 3. No supply voltage at the answer-back unit | Measurement: St 20/9<br>N 12 V | 1. Establish connection between St 20/9 and St 15/1<br>2. Replace power supply unit, F 01 resp. LP 15, A 02 |
| | 4. Answer-back unit is defective | Measurement: LP 37/36<br>Signal T 2 T<br>Flickering indication about 6 V⎍⎍⎍ | Replace answer-back unit |
| | 5. LP 37 is faulty | — | Replace LP 37 |
| 122 During the operation of the answer-back unit wrong characters are printed out | 1. Answer-back receiver or transmitter is defective | — | Replace answer-back unit |
| | 2. LP 37 is faulty | — | Replace LP 37 |
| 123 The indication "keyboard lock" does not disappear upon termination of the answer-back message | Defect on the 6th track | | |
| | 1. Answer-back transmitter or receiver is defective | | Replace answer-back unit |
| | 2. LP 37 is faulty | | Replace LP 37 |
| 124 Signal $\overline{\text{WD}}$ (WHO ARE YOU) does not release the answer-back unit | 1. LP 9 is faulty | Measurement: LP 9 / a 13<br>Signal $\overline{\text{WD}}$ ("1" to "0" momentarily) | Replace LP 9 |
| | 2. Interruption between LP 9 and LP 37 | Measurement: Bu 26 / B 8<br>Signal $\overline{\text{WD}}$ | Establish connection |
| | 3. LP 37 is faulty | Measurement: LP 37 St 22/7<br>Signal $\overline{\text{TAKG 1}}$ (+12 V to 0 V) | Replace LP 37 |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **130 Tape Punch (ELO)** | | | |
| 131 The tape punch does not work | 1. Plug-in connections St 12 / Bu 12 or St 13 / Bu 13 disengaged | Check plug-in connections | Establish plug-in connections |
| | 2. Plug-in connection St 17 / Bu 17 is disengaged | Check plug-in connection | Establish plug-in connection |
| | 3. LP 5 is faulty | — | Replace LP 5 |
| 132 The tape punch fails to punch single tracks. The tape punch performs all other functions without fault | 1. LP 5 is faulty | Switch on the tape punch. Depress the letters shift key and then the repeat key. Measurement: LP 5<br>b18 $\overline{M1}$ (+12 V to 0 V)<br>b 5 $\overline{M2}$ (+12 V to 0 V)<br>b11 $\overline{M3}$ (+12 V to 0 V)<br>a12 $\overline{M4}$ (+12 V to 0 V)<br>a30 $\overline{M5}$ (+12 V to 0 V)<br>a20 $\overline{MT}$ (+12 V to 0 V) | Replace LP 5 |
| | 2. Interruption between LP 5 and ELO St 12 or 13 | Check the connection | Establish connection<br>Adjust correctly |
| | 3. Deviation of adjustments | Check adjustments (see section 3.2.8.2. to 3.2.8.4.) | Adjust correctly |
| | 4. Tape punch is defectife | — | Replace tape punch |
| 133 No tape run-out after (v) depression of the key | 1. With the cover closed the space-back lever is actuated | Open the cover, actuate the Run Out key | Set the space-back lever lower |
| 134 The tape is advanced disproportionately | 1. Tension springs on the tape feed device are interchanged | The strong tension spring must be inside (towards the frame side)<br>The weak tension spring must be outside | Engage the tension springs in the right manner |

| Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|
| **140 Tape Reader (LS)** | | | |
| 141 The tape reader cannot be switched on | 1. Flap of the tape reader is not completely closed | Check the flap | Close the flap |
| | 2. End-of-tape contact is defective | Measurement: Bu 2/2<br>Contact actuates the signal $\overline{\text{STE}}$<br>+12 V | Replace the tape reader |
| | 3. LP 39 is faulty | Measurement: LP 39/8<br>Signal $\overline{\text{TLE}}$ (+12 V to 0 V) | Replace LP 39 |
| | 4. Interruption between LP 39 and LP 38 | Measurement: Bu 21/19<br>Signal $\overline{\text{TLE}}$ | Establish connection |
| | 5. Interruption between LP 37 and LP 38 | Measurement: LP 38/15<br>Signal G 192 (19.2-kHz clock)<br>approx. 5 V⎍⎍⎍⎍ | Establish connection |
| | 6. LP 38 is faulty | — | Replace LP 38 |
| | 7. LP 37 is faulty | Measurement: LP 37 / Bu 4/16<br>Signal G 192 | Replace LP 37 |
| 142 The tape is not advanced | 1. Plug-in connection Bu 2 - tape reader is disengaged | Check plug-in connection | Establish plug-in connection |
| | 2. Reader motor control is faulty | — | Replace LP 38 |
| | 3. The stepping motor is defective | — | Replace the tape reader |
| 143 No printing despite tape feed | 1. Plug-in connection Bu 1 - tape reader is disengaged | Check plug-in connection | Establish plug-in connection |
| | 2. LP 38 is faulty | — | Replace LP 38 |
| | 3. LP 37 is faulty | — | Replace LP 37 |
| | 4. Dirty tape reader contacts | Check tape reader contacts | Clean the tape reader contacts |

| | Fault | Possible Cause | Test Procedure | Action |
|---|---|---|---|---|
| 144 | The punched tape is not read correctly | 1. The sensing contact is worn out | Check the sensing contact | Replace the tape reader |
| | | 2. The punched tape is defective | Check the punched tape | — |
| 145 | The tape reader fails to be switched off during break-in operation | 1. LP 37 is faulty | Measurement: LP 37 Bu 4/14<br>Signal $\overline{GS1}$ (+12 V to 0 V)<br>Pulse<br>at 100 bauds approx. 1.3 ms<br>at 50 bauds approx. 2.5 ms | Replace LP 37 |
| | | 2. Interruption between LP 37 and LP 38 | Measurement: LP 38/13<br>Signal $\overline{GS1}$ | Establish connection |
| | | 3. LP 38 is faulty | — | Replace LP 38 |






LP 39 — seen from above

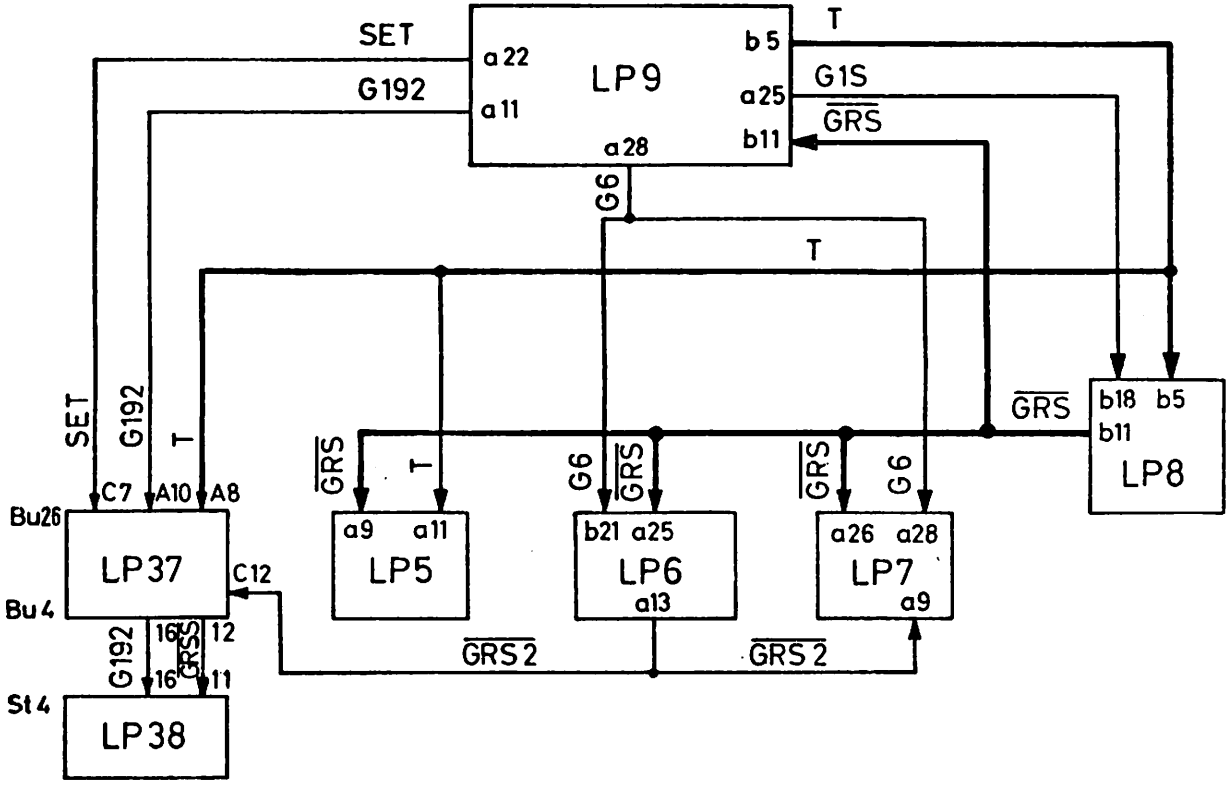



Abb. 2-5 Grundstellung bei Netzanschluß
Fig. 2-5 Basic Position with Mains Connection

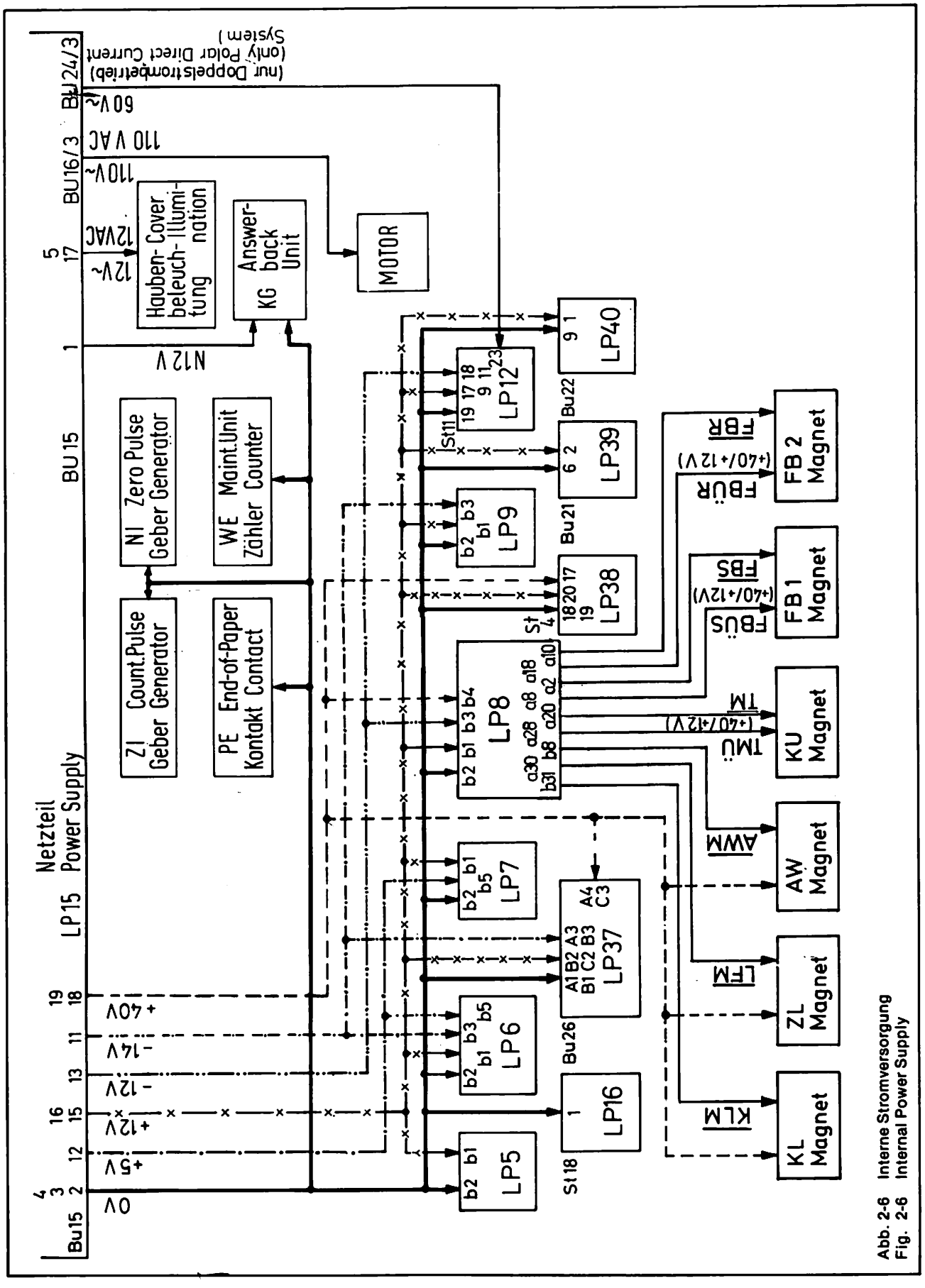



Abb. 2-6 Interne Stromversorgung
Fig. 2-6 Internal Power Supply

## 2.6. Testing within a Fault Clearing Procedure

After a fault clearing procedure the following actions have to be carried out, as required:

- Paper and color remainders as well as cuttings have to be removed
- The quality of the color ribbon has to be verified and the color ribbon cartridge replaced if required
- The paper roll has to be checked and new paper be loaded, if required
- The light-barrier of the answer-back unit has to be cleaned by passing through with a cleaning rod (resp. cleaning brush resp. tweezers with a rag).

In addition it shall be verified whether (see section 3.2.1.)

- the ring shaft (type bar bearing) is oiled
- the drive shaft of the printing unit is greased
- the guide axle is oiled
- the toothing and the axle of the coding disk of the answer-back unit is slightly greased.

Upon removal of the color ribbon cartridge the returning portion of the printing cam has to be checked for wear and tear. The depth of the impacts points should not exceed 0.4 mm (0.016 in.). For measuring a wire of leaf gauge is used.

Replace the printing cam, if required (see section 3.1.7.)

## 2.7. Functional Testing

### 2.7.1. General Hints

After a repair the SEL-Teleprinter LO 2000 has to be checked for its functional performance.

### 2.7.2. Keyboard

Switch on the equipment by depressing the local key (L)
The indication for local operation must light.

Depress all keys of the keyboard one after another and see that the correct characters are being printed.

By alternately depressing the keys "M" and line feed [≡] check the paper feed (linearity). The color ribbon must be advanced and the character be printed in transmit color.

Bring the printing unit in the start-of-line position. Select 59 (62) characters on the keyboard. At the 59th (62nd) character the buzzer must be sounded. After another ten characters (69th |72nd| character) the keyboard must be electrically locked. No more characters are printed and the indication "keyboard lock" is lighted. The keys "Repeat" [....] "Carriage Return / Line Feed (NL)" [↵] and "Carriage Return" [<] are not locked.

Start the answer-back unit by depression of the answer-back key (◇) and check its correct functioning.

### 2.7.3. Tape Punch (ELO)

Switch on the tape punch by depressing the key "Punch ON" (◎). The indication next to the key must light.

Prepare a punched tape by means of the Tape Run-Out key (v) (letters resp. figures combination). Subsequently check by means of the gauge.

On the keyboard depress the "Who Are You" key [✠]. No punching of the tape must take place.

### 2.7.4. Tape Reader (LS)

Insert the punched tape with text into the tape reader. Depress the key "Reader ON" (◎). The equipment must print the message contained on the punched tape. The indication "Reader ON" and the indication "keyboard lock" must light. The keyboard lock is effective throughout the time the tape is being read in the tape reader.

Open the reader flap during reading. The tape reader must be immediately stopped. At the end of the tape, reader must be stopped, too.

Load the punched tape again. Depress the key "Step" (•••••)
The punched tape is advanced step by step. The read character are printed.

By the depression of the key "Skip" (☺) the punched tape is advanced step by step. No printing action takes place.

### 2.7.5. Connection to the Exchange

Upon depression of the key (◎) the teleprinter is started, and the indication is lighted. It disappears if the desired subscriber is free.

Selecting of the desired subscriber is performed by means of the figures keys 1 through 0. For a check the selected number is printed. Upon establishment of the connection a buzzer signal is momentarily sounded. Send a short message to the subscriber and verify for its correctness. During the reply message check the break-in operation. Upon completion of these tests switch off the equipment.

# 3. REPAIR

CONTENTS


| | | Page |
|---|---|---|
| 3.1. | Disassembly and Assembly | 3 — 3 |
| 3.1.1. | SEL Teleprinter LO 2000, compl. | 3 — 3 |
| 3.1.2. | Keyboard | 3 — 4 |
| 3.1.3. | Functional Keys | 3 — 5 |
| 3.1.4. | Tape Reader (LS) | 3 — 5 |
| 3.1.5. | LP 37 Transmitter Control with Cable | 3 — 5 |
| 3.1.6. | Paper Guide | 3 — 6 |
| 3.1.7. | Printing Unit | 3 — 7 |
| 3.1.8. | Power Supply Unit | 3 — 9 |
| 3.1.9. | Motor | 3 — 9 |
| 3.1.10. | Answer-back Unit | 3 — 10 |
| 3.1.11. | Tape Punch (ELO) | 3 — 10 |
| 3.1.12. | Feed Gear | 3 — 10 |
| 3.1.13. | Carriage Return (CR) Spring Barrel | 3 — 12 |
| 3.2. | Adjustments and Lubrication | 3 — 13 |
| 3.2.1. | Comments as to the Lubricating Instructions | 3 — 13 |
| 3.2.2. | Tape Back Space Key for the Tape Punch | 3 — 14 |
| 3.2.3. | Microswitch (End-of-Line Switch) | 3 — 14 |
| 3.2.4. | Paper Plate-to-Platen Clearance | 3 — 15 |
| 3.2.5. | Parallelism between Paper Plate Edge and Platen | 3 — 16 |
| 3.2.6. | Paper Guide Plates | 3 — 16 |
| 3.2.7. | Motor Belt Tension | 3 — 16 |
| 3.2.8. | Tape Punch | 3 — 16 |
| 3.2.8.1. | Synchronization | 3 — 16 |
| 3.2.8.2. | Adjustment of Magnetic Block (Below, St 13) | 3 — 17 |
| 3.2.8.3. | Functional-Cam-to-Straightbar Clearance | 3 — 17 |
| 3.2.8.4. | Adjustment of Magnetic Block (Above, St 12) | 3 — 17 |
| 3.2.9. | Color Ribbon Solenoid Coils | 3 — 18 |
| 3.2.10. | Line Feed Bracket | 3 — 19 |
| 3.2.11. | End-of-Paper Contact | 3 — 19 |
| 3.2.12. | Backlash on the Feed Gear | 3 — 20 |
| 3.2.13. | Stepping Mechanism | 3 — 21 |
| 3.2.14. | Clearance between Trip Cam and Arresting Pawl | 3 — 21 |
| 3.2.15. | Carriage Stops | 3 — 22 |
| 3.2.16. | Toothed Feed Belt | 3 — 23 |
| 3.2.16.1. | Belt Tension | 3 — 23 |
| 3.2.16.2. | Parallel Adjustment | 3 — 23 |
| 3.2.16.3. | Central Running | 3 — 24 |
| 3.2.17. | Fitting the Clamping Piece on the Toothed Feed Belt | 3 — 24 |

## 3.1. Disassembly and Assembly

### 3.1.1. SEL Teleprinter LO 2000, compl.

When detaching the transmitter from the receiver, disconnect screw plug connection St/Bu 26 (1) and remove the two fastening screws (4) to the left and right of St/Bu 26. There-upon, the transmitter can be pulled off from the two flat rails (5).

To remove the keyboard cover, loosen the five fastening screws (6) from below.

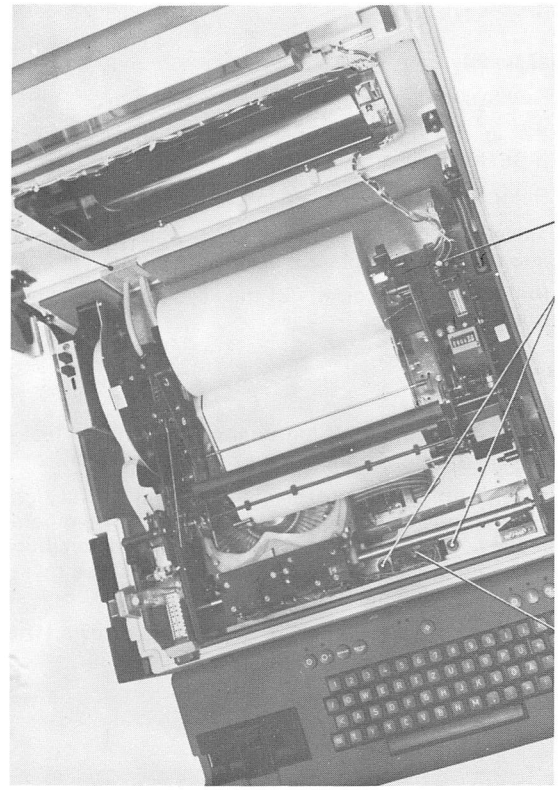
When replacing the keyboard cover, take care that the tape reader, tape reader keys, FSE-KG (subscriber unit and answer-back unit) keys, and the keyboard project through the cover without touching it and, as far as possible, with a uniform gap all the way round.

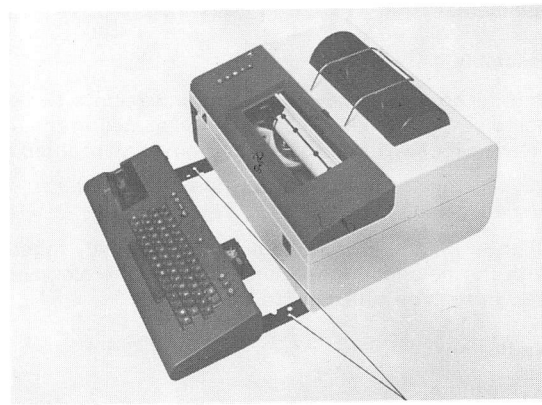
In order to remove the receiver from its housing, disconnect the screw plug connections St/Bu 26 (1) and St/Bu 17 (2) and remove the rubber bushing (3) from the bottom part of the housing. The mains cable and telegraph cable can now be fed through the hole in which the rubber bushing was located.

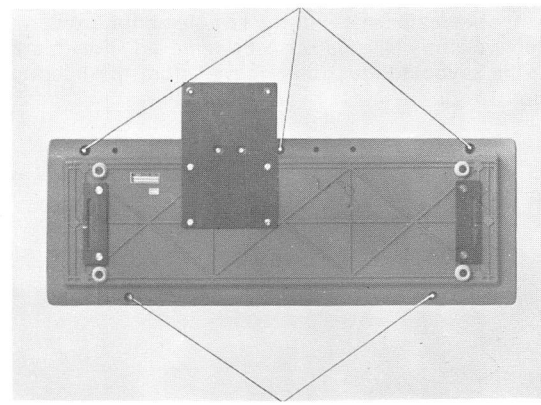
The receiver can then be lifted out of its housing, holding it on the two cheeks of the paper guide.

Assembly is carried out in the reverse order.

When replacing the screw plug connections St/Bu 26, take care that the camfered edges of the plug and socket are on the left and that the knurled resp. hexagonal screw is tightened only by hand.



### 3.1.2. Keyboard

**Disassembly**

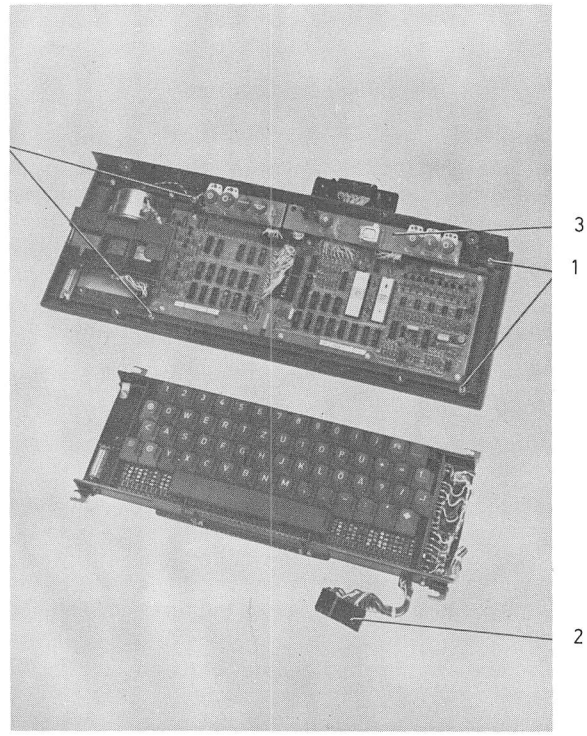
— Remove keyboard cover (section 3.1.1.)

— Swing out the subscriber unit and answer-back unit (FSE/KG) key strip (3)

— Remove the four keyboard fastening screws (1)

— Move the keyboard to the right, then swing it forwards and upwards, and place it beside the teleprinter

— Pull off the two sockets of the keyboard plug connection St 3 (2).




**Assembly**

— In reverse order.
When replacing the plug connection, ensure that the pins in the plug connector are correctly seated

— When fitting the four fastening screws (1), first tighten them lightly and, with the keyboard cover temporarily replaced, adjust the keyboard for central positioning and correct operation. The two ground cables must be clamped under the rear fastening screws

— Now completely tighten the fastening screws (1) and replace the keyboard cover.

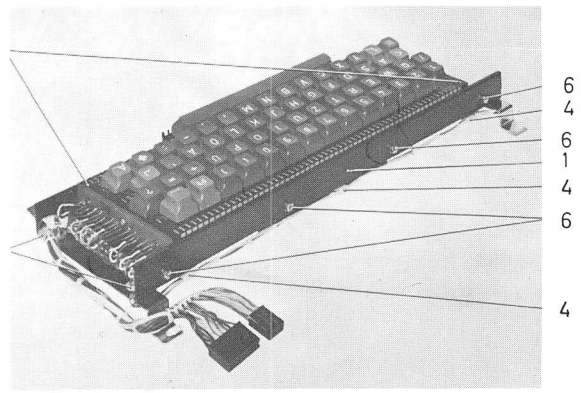
**Key Element**

**Disassembly**

— In order to replace key elements, first remove the keyboard cover. If the key elements are located in the area of the space key, the bar of this key must first be lifted off.

— Loosen the fastening screws (6) and lift off the rear angled locking plate rail (5)

— Slightly lift the key element to be replaced, together with the neighbouring elements, until the element is free and can be pulled out to the rear.




**Assembly**

In reverse order.

**Light Barrier**

Replacement of the light barrier (7) is carried out in a similar manner to replacement of the key elements, except that the cable clamps (4) must also be removed. For this purpose, the keyboard must be removed from the teleprinter (section 3.1.2.).

### 3.1.3. Functional Keys

**Disassembly**

— Remove the keyboard cover (section 3.1.1.)

— Remove the keyboard (section 3.1.2.)

— Pull the subscriber and answer back unit (FSE/KG) key strip (1) from its center pins (3) and swing it out

— Disconnect plug connectors St 22 and St 23 (5)

— Pull the tape reader key strip (2) from its center pins (6) and swing it out

— Disconnect plug connector St 21 (4).

**Assembly**

— Connect plug connector St 21 of the new tape reader key strip

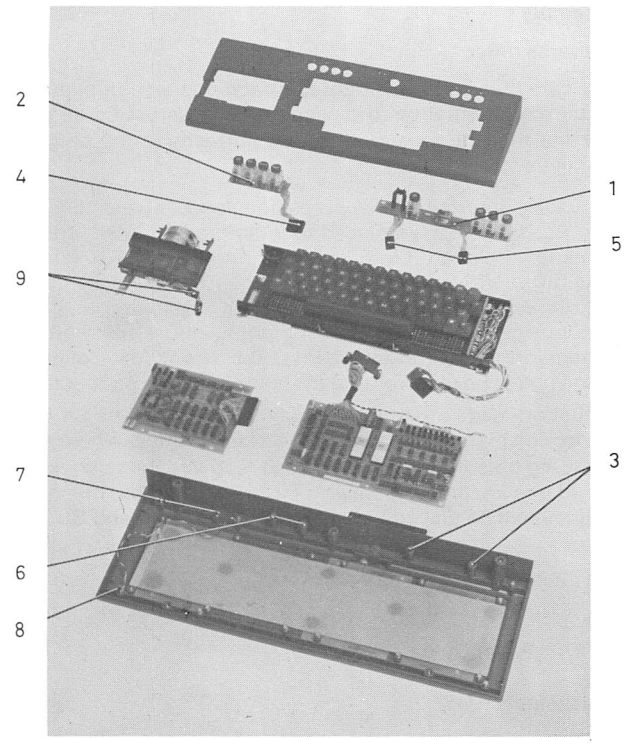
— Fit the tape reader keys on the center pins

— Connect plug connectors St 22 and St 23 of the new subscriber and answer back unit (FSE/KG) key strip

— Fit the subscriber and answer back unit keys on their center pins

— Install the keyboard

— Fit the keyboard cover temporarily and align the keyboard so that it is central and operates freely.




### 3.1.4. Tape Reader (LS)

**Disassembly**

— Remove the keyboard cover (section 3.1.1.)

— Remove fastening screws (7)

— Remove fastening nut (8)

— Lift out the tape reader

— Disconnect female connectors Bu 1 and Bu 2 (9).

**Assembly**

In reverse order.

If the inclination of the reader does not coincide with that of the keyboard cover, the nut (8) and lock nut provide correction facilities.

### 3.1.5. LP 37 Transmitter Control with Cable

**Disassembly**

— Remove the transmitter from the receiver (section 3.1.1.)

— Remove the keyboard cover (section 3.1.1.)

— Remove the keyboard (section 3.1.2.)

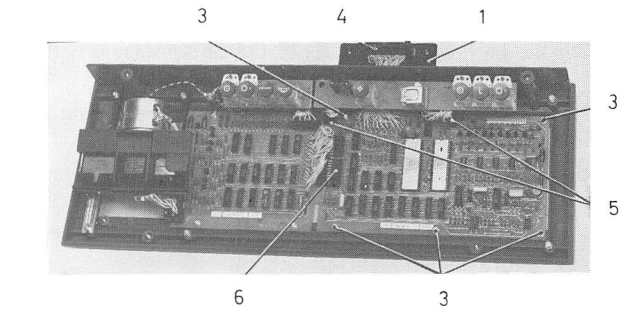
— Unscrew Bu 26 (4) from the connection plate (1)

— Unscrew the two fastening screws (2) (in the illustration on the next page) of the cable clamp from below; remove the cable clamp (if fitted)

— Unscrew the six fastening screws (3) of the transmitter PC board LP 37

— Pull off plug connectors St 22, St 23 (5), and St 4 (6)

— Feed the cable with Bu 26 through the aperture in the base plate.



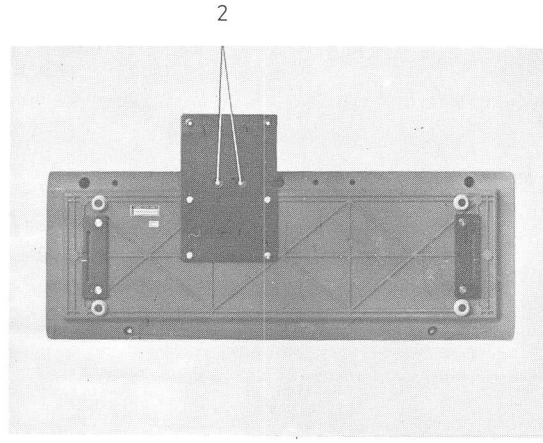
**Assembly**

In reverse order.

Take care that Bu 26 is mounted on the connection plate in the correct orientation (the camfered edge must be on the left) and that the pins are inserted correctly in the plug-in connections.

Both long interference suppression leads swge coming from Bu 26 A7, B9 are placed together and isolated with a shrinkdown platic tubing. For mounting the PCB 37 into a transmitter with protective arrangements against electrostatic discharges, these leads remain isolated, i.e. they does not get connected. For mounting into a transmitter without protective arrangements, the shrinkdown plastic tubing has to be removed and the leads are to be connected.

Both short leads are together fastened with screws on the connection plate. In older versions of teleprinters where the mounting hole does not exist, each lead is connected with one of the fastening screws of Bu 26. Thereby the ring tongue must be placed between the screw head and Bu 26.



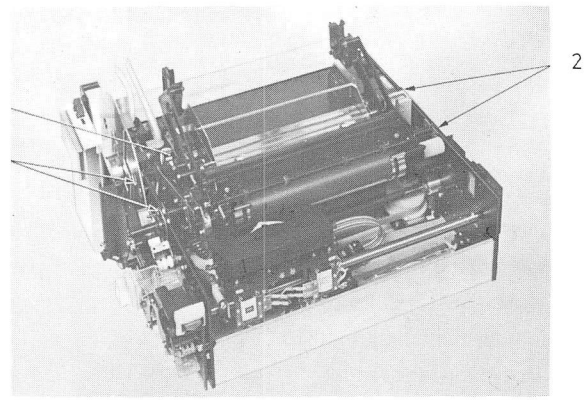

### 3.1.6. Paper Guide

**Disassembly**

— Remove female connector Bu 19 (1)

— Loosen the four fastening nuts (2) on the two sides of the frame

— Remove the paper guide.




**Assembly**

In reverse order.

**Platen**

**Disassembly**

— Remove the paper guide (section 3.1.6.)

— Lift off the pressure roll (5) from the platen (11)

— Remove the pressure roll axle

— Unhook two springs (6) of the paper trough

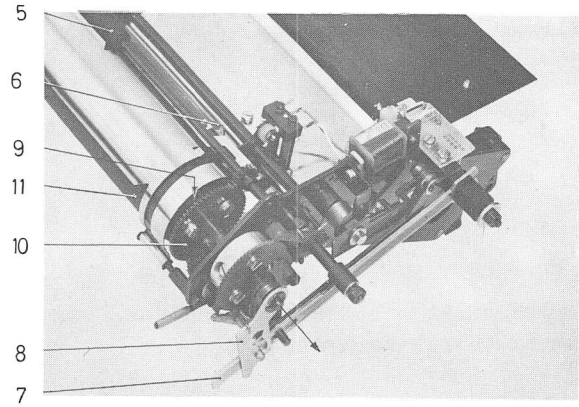
— Remove the platen turning handle (completely unscrew the grub screw)

— Set the line selector rod (7) to the uppermost position of the line selector lever (8). (Single line feed)

— Mechanically disengage the line selector rod (7) and the line selector lever (8) by pushing to the side

— Unscrew the fastening screw (9) of the platen located beside the toothed wheel (10)

— Pull out the platen shaft in the direction indicated by arrow until the platen is completely released.




**Assembly**

In reverse order.

### 3.1.7. Printing Unit

**Disassembly**

— Remove the paper guide (section 3.1.6.)

— Move the printing unit to the start-of-line position in order to release the tension on the carriage return mechanism. For that purpose, press the detent lever (1) on the feed gear to the rear

— Disengage the printing unit from the toothed drive belt by depressing the toothed belt near the toothed-belt-clamping piece downwards

— *In case of right-to-left printing direction: move the printing unit to the end-of-line position*

— Pull off plug connector St 25 (5) of the printing unit

— Move the printing unit approx. to the middle-of-line position

— Position the drive shaft so that the screw of the slotted sleeve (2) point upwards

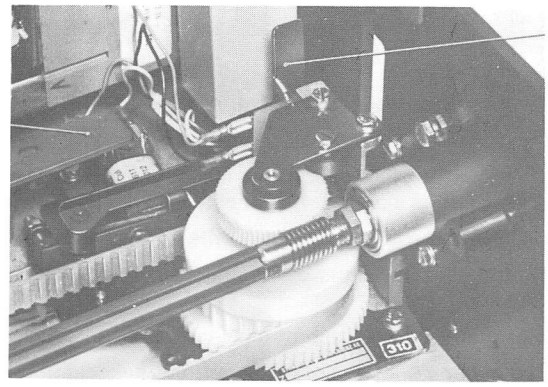
— Loosen the two screws in the slotted sleeve (2).
**Warning!** Do **not** unscrew fully!

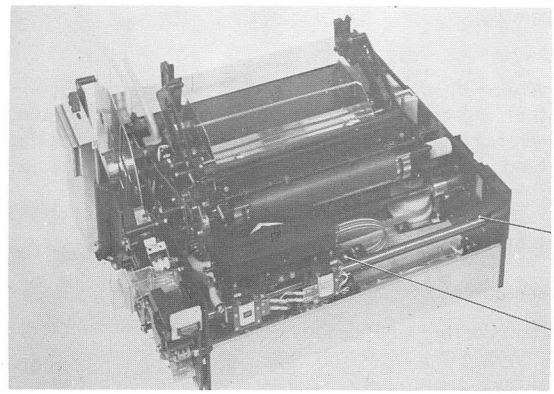
— Remove the screw (3) of the guide gudgeon in the guide rod

— Support the printing unit and slide the slotted sleeve and the guide gudgeon towards the printing unit

— Move the drive shaft to the left

— Lift out the printing unit.



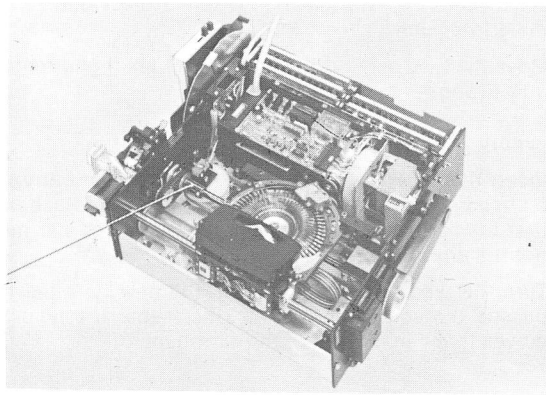

**Assembly**

— Move the toothed-belt clamping piece slightly to the right from the start-of-line position by hand.
*(In case of right-to-left printing direction: move it to the left)*

— Insert the printing unit, ensuring that the slide rail (4) lies between the two guide rollers

— Make all connections in reverse order

— Slide the printing unit towards the clamping piece by hand until it engages (transmission connection between printing unit and toothed drive belt).



### Printer Cam

#### Disassembly

— Remove the paper guide (section 3.1.6.)

— Remove the color ribbon cartridge

— Remove the color ribbon feed mechanism. The solenoid connections may be left connected

— Remove the three screws (6) of the printer cam

— Slightly lift the center of the printer cam (take care with the center pins)

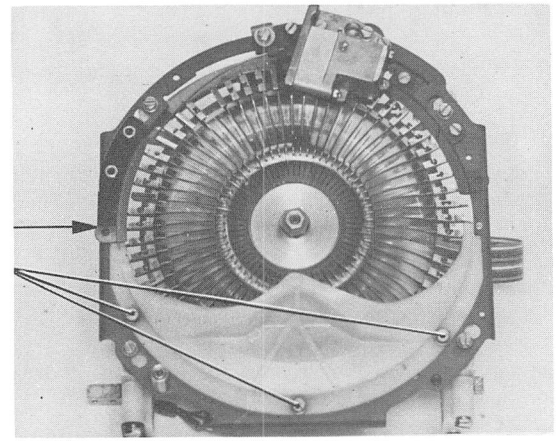
— Disengage the left end of the cam from the locking pin

— Detach the right end of the cam from the locking device by swinging the printer cam slightly.

#### Assembly

In the reverse order.

— When refitting the color ribbon feed mechanism, ensure that the transport connection between the eccentric lever of the carriage and the drive fork of the color ribbon feed is correct.




### Type Bar

#### Disassembly

— Remove the paper guide (section 3.1.6.)

— Turn the type-bar carrousel until the type bar to be replaced is on the guide wire

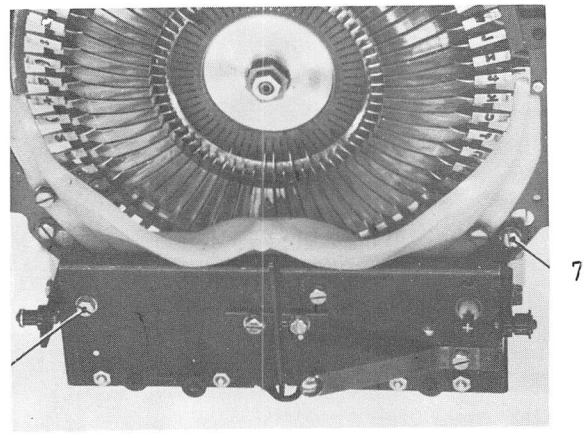
— Turn the type-bar carrousel in the counter-clockwise sense until the type bar has reached the slope (×) of the printer cam

— Move the type bar above the carrousel shaft and remove it by lifting.

#### Assembly

— Insert the new type bar and turn the type-bar carrousel by hand at least one complete revolution to make sure that the carrousel moves freely (the new type bar must not rub anywhere)

— Turn the type-bar carrousel until the new type bar has passed the selection station. Check that the type bar moves freely in the slot of the carrousel.




### Color Ribbon Feed Mechanism

#### Disassembly

— Remove the color ribbon cartridge

— Pull off the plug-in connections from the flat solenoids

— Remove the hexagon head screws (7) located below the right upper corner of the feed mechanism

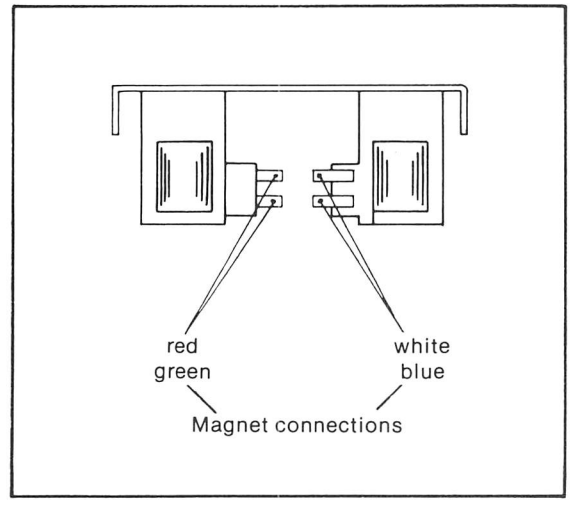
— Remove the hexagon head screw (8) alongside the left cartridge lock

— Take off the color ribbon feed mechanism.

#### Assembly

— Assembly is carried out in reverse order.
Check that the transmission connection between the eccentric lever of the carriage and the drive fork of the color ribbon feed is correctly engaged

— Reconnect the plug-in connections.



**Color Ribbon Solenoids**

In case of failure of the electromagnets due to overloading, it always will be necessary to replace the PC board LP 8 as well.

**Disassembly**

— Remove the color ribbon cartridge

— Disconnect the plug-in connections (9) of the solenoid

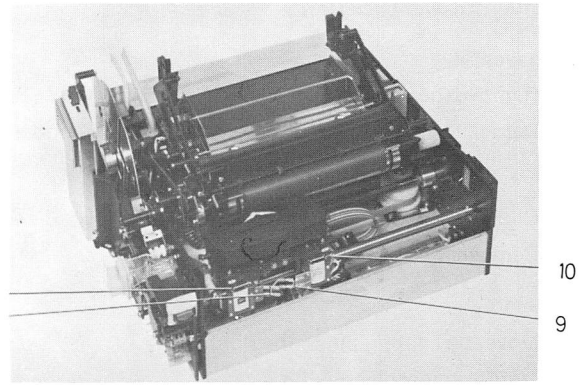
— Unscrew the fastening nuts (10) of the solenoid coil.

**Assembly**

— Fit the new solenoid coil and adjust it so that the armature moves easily in its guide

— Fit the solenoid connections.

After replacement, see the adjustment instructions in section 3.2.9.!




### 3.1.8. Power Supply Unit

**Disassembly**

— Remove the paper guide (section 3.1.6.)

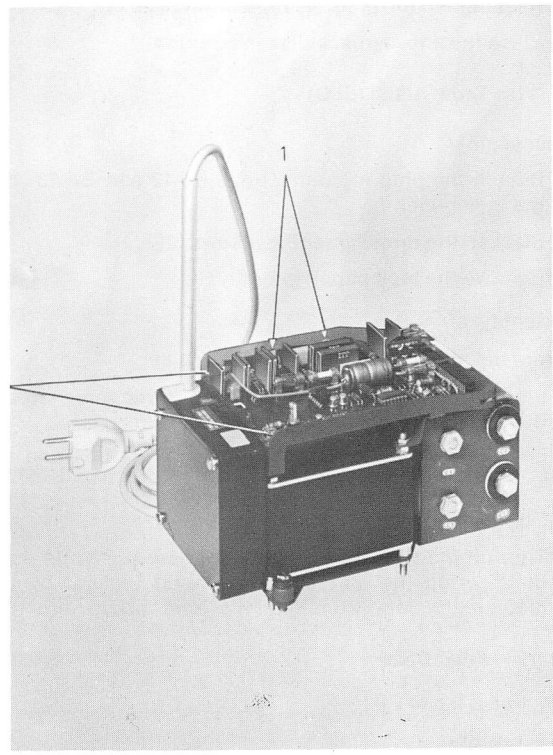
— Disconnect the two plug connectors (St 15, St 16) on PCB 15

— Remove the two screws on the base of the power supply unit.

In the case of the function state A 02 of power supply units, the PCB 15 can be removed from the remaining power supply unit by disconnecting the plug-in connections St / Bu 28 (1) and loosening the two screws (2).

**Assembly**

In reverse order.




### 3.1.9. Motor

**Disassembly**

— Remove the paper guide (section 3.1.6.)

— Remove the power supply unit (section 3.1.8.)

— Unscrew the fastening screws (1) of the motor (in the right-hand side wall)

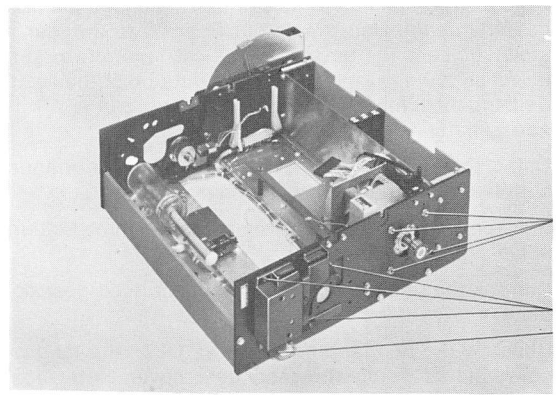
— Remove the toothed drive belt

— Lift out the motor upwards and to the left.

**Assembly**

In reverse order.

After installation, see adjustment instructions in section 3.2.7.



### 3.1.10. Answer-back Unit

**Disassembly**

— Remove the answer-back disk

— Detach the plug-in connection St 20 (3) at the underside of the answer-back unit housing (see illustration of the previous page section 3.1.9.)

— Unscrew the three fastening screws (2)

— Remove the answer-back unit housing.

**Assembly**

— Move the bearing pin to the right stop

— Lightly screw on housing

— Check that the bearing pin rotates freely. If required, correct the fastening of the housing

— Screw down housing

— Reestablish the plug-in connection St 20 (3)

— Place the answer-back disk in position.

### 3.1.11. Tape Punch (ELO)

**Disassembly**

— Detach the plug-in connections Bu 12 and Bu 13 (1) at the tape punch

— Slacken the three fastening screws (2)

— Remove the tape punch laterally.

**Assembly**

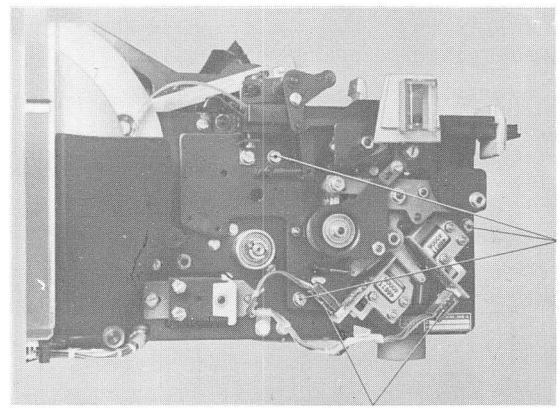
Before replacing, check adjustment 3.2.8.

— Lightly fix the tape punch with the lower screw so that the punch can still be swivelled

— Set the line feed bracket to its rearmost position and lock it there with a screwdriver

— Fit the drive belt

— Tighten the tape punch fastening screws. While doing this, set-up the correct toothed belt tension by displacing the tape punch in the appropriate direction.




### 3.1.12. Feed Gear

**Functional Issue F 01**

**Disassembly**

— Remove the paper guide (section 3.1.6.)

— Remove the printing unit (section 3.1.7.)

— Hold the toothed belt at its center. Disengage the detent pawl by depressing the detent lever (1) to the rear and slowly release the tension of the carriage return spring barrel until the key head (3) on the outside of the toothed belt touches the shaped piece on the carriage return spring barrel (see fig. in section 3.2.16.1.)

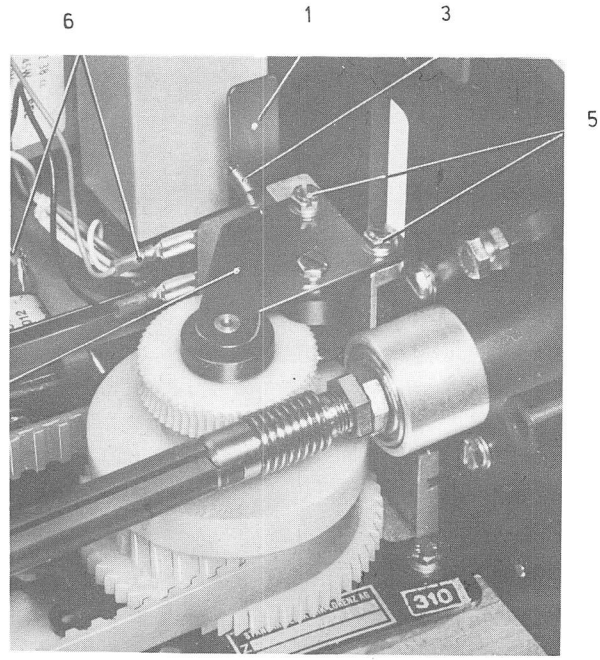
— Detach the plug-in connections (6) from the magnetic clutch and the detent pawl magnet

— Slacken the toothed belt by removing the three fastening screws (2) of the feed gear

— Unhook the tension spring (3) from the feed gear cover plate (4)

— Unscrew the two fastening screws (5) of the feed gear cover plate. Swing the feed gear cover plate around approx. 180° and lift it away. Disengage the toothed belt

— Remove the feed gear.

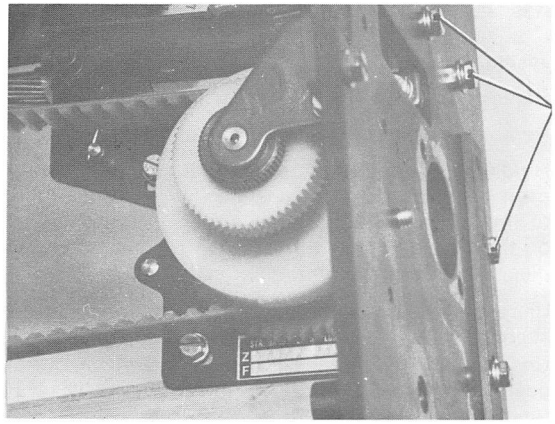


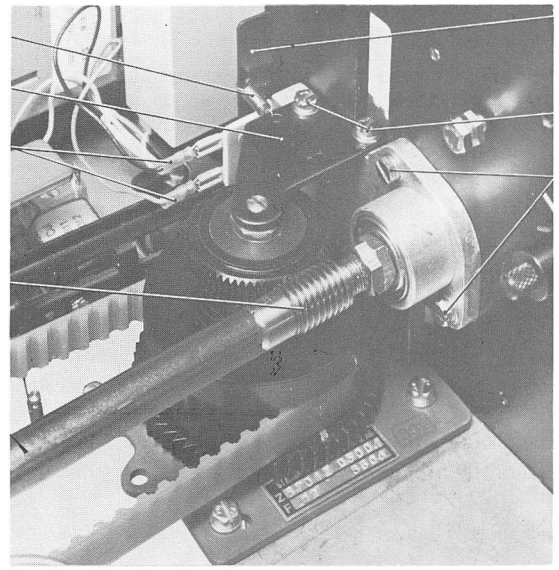
**Assembly**

This is carried out in reverse order, taking care that the trip cam (2) of the toothed belt is to the left and in front of the detent pawl (1) (see second fig. in section 3.1.13.).

After engaging the toothed belt, the feed gear cover plate (4) must be fastened before the feed gear is screwed down.

After installation, see adjustment instructions 3.2.12., 3.2.13., and 3.2.14.!



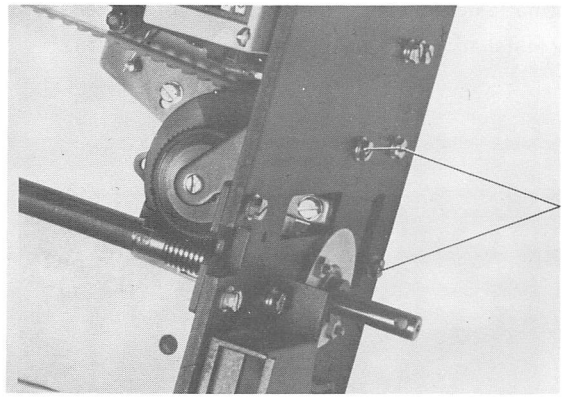




**Functional Issue F 02**

**Disassembly**

- Remove the paper guide (section 3.1.6.)
- Remove the printing unit (section 3.1.7.)
- Hold the toothed belt at its center. Disengage the detent pawl by depressing the detent lever (1) to the rear and slowly release the tension of the carriage return spring barrel until the key head (3) on the outside of the toothed belt touches the shaped piece on the carriage return spring barrel (see fig. in section 3.2.16.1.)
- Remove the coding disk of the answer-back unit
- Detach the plug-in connections (6) from the magnetic clutch and the detent pawl magnet
- Remove the drive shaft (7) after unscrewing screws (8)
- Slacken the toothed belt by removing the three fastening screws (2) of the feed gear
- Unhook the tension spring (3) from the feed gear cover plate (4)
- Unscrew the two fastening screws (5) of the feed gear cover plate and lift off the cover plate. Disengage the toothed belt.

  *(In case of right-to-left printing direction: move the arresting pawl (9) away before disengaging the toothed belt.)*
- Lift out the feed gear.




**Assembly**

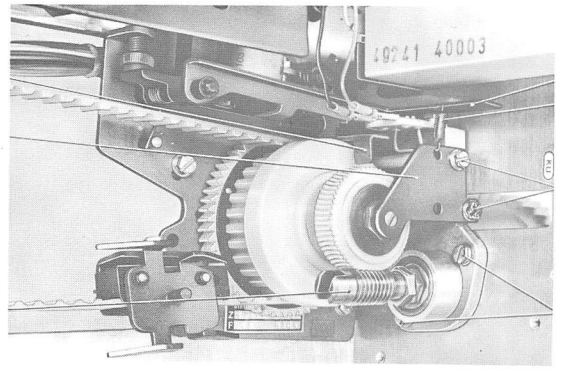
This is carried out in reverse order. Take care that the trip cam (2) of the toothed belt is to the left and in front of the detent pawl (1) (see second fig. in section 3.1.13.).

*(Not applied in case of right-to-left printing direction.)*

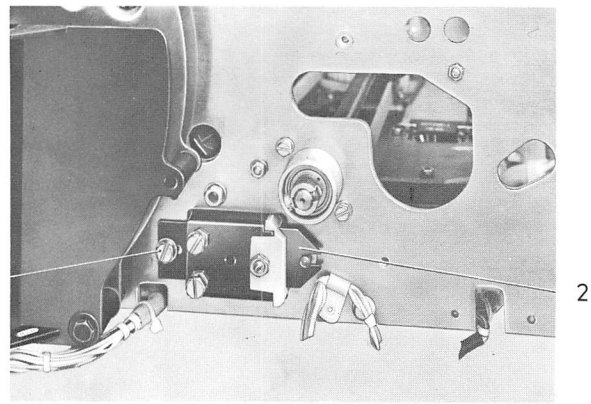
After engaging the toothed belt, the feed gear cover plate (4) must be fastened before the feed gear is screwed down.

Subsequently lightly screw on the feed gear with the fastening screws (2), then install the drive shaft and screw it on with the fastening screws (8). Screw down fastening screws (2).

After installation, see adjustment instructions 3.2.13. and 3.2.14.



### 3.1.13. Carriage Return (CR) Spring Barrel




**Disassembly**

— Remove the paper guide (section 3.1.6.)

— Remove the printing unit (section 3.1.7.)

— Hold the toothed belt at its center. Disengage the detent pawl (see section 3.1.12.) and slowly release the tension of the carriage return spring barrel until the key head on the outside of the toothed belt touches the shaped piece on the carriage return spring barrel

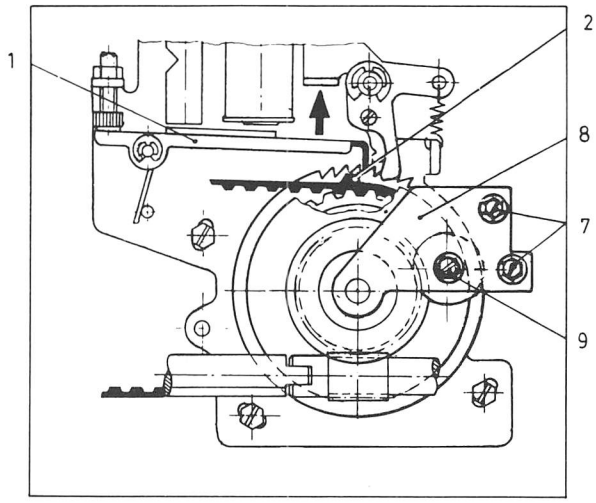
— Unscrew the fastening screws (2) of the feed gear (see second fig. in section 3.1.12.), if it is functional issue F 01.
Unscrew the fastening screws (2) and (8) of the feed gear (see third and fourth fig. in section 3.1.12.) if it is functional issue F 02

— Remove the locking screw (1) of the spring barrel lock (2). Push back the lock until the barrel is released

— Unhook the tension spring from the feed gear cover plate (8). Unscrew the two fastening screws (7) of the feed gear cover plate. Swing the cover plate around approx. 180° (if it is functional issue F 01) resp. lift it off (if it is functional issue F 02)

— Disengage the toothed belt from the feed gear.
*(In case of right-to-left printing direction: move the arresting pawl (see section 3.1.12.) away before disengaging the toothed belt.)*

— Remove the carriage return spring barrel together with the toothed belt.




**Assembly**

This is carried out in reverse order. Take care that the trip cam (2) of the toothed belt is to the left and in front of the detent pawl (1) of the feed gear.

*(Not applied in case of right-to-left printing direction.)*

After engaging the toothed belt, the feed gear cover plate (8) must be fastened before the feed gear is screwed down.

After installation, see adjustment instruction 3.2.16.!

## 3.2. Adjustments and Lubrication

### 3.2.1. Comments as to the Lubricating Instructions

The symbols used in the following adjusting and lubricating instructions convey the following meaning:

○ = Oil

Type of oil: Teleprinter oil K
30 ml Order No. 3100028207
100 ml Order No. 3100028204

⊖ = Grease slightly

Type of grease: Teleprinter grease K
40 g Order No. 3100538702

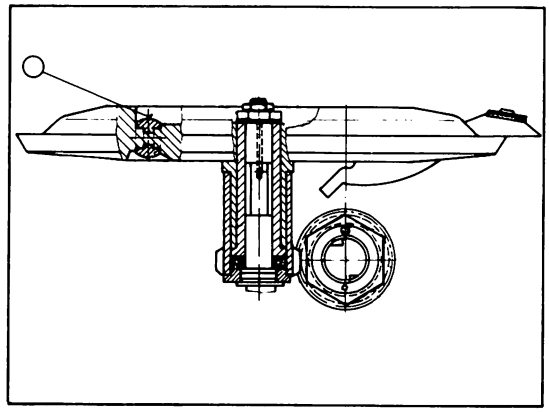
The unit of force used in the adjusting instructions is indicated in newtons:

1 N = 1 (kg) (m) ($sec^{-2}$) = 0.102 kp

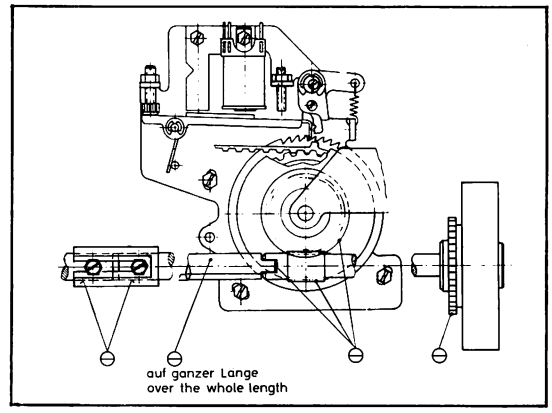
1 kp = 9.80665 N ≈ 10 N

This new unit of force replaces the kilopond so far used and will be introduced by law to be effective as from Jan. 1, 1978. To facilitate matters for the technician, the indication in newtons (N) is supplemented by that in pond or kiloponds.

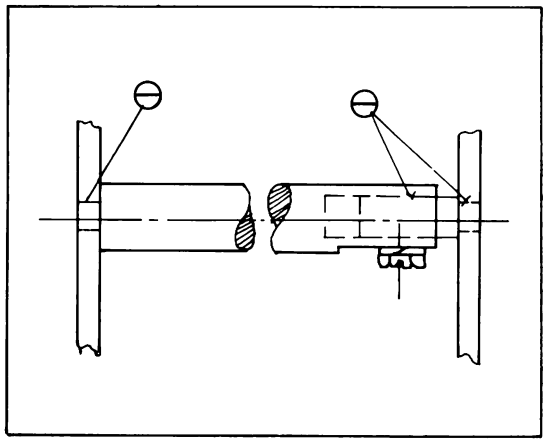
**Checking the Lubrication Points**



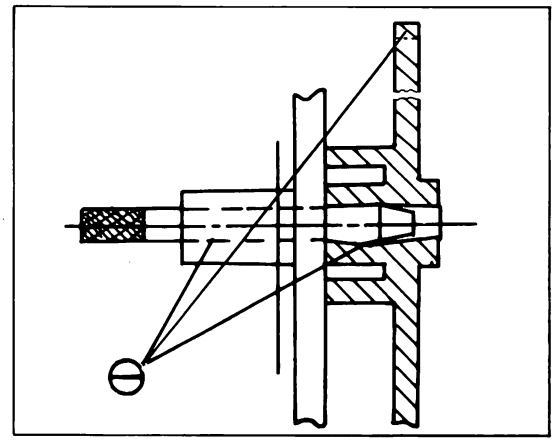
Ring Axle




Driving Shafts and Gear Wheel



Guide Rod



Answer-back Unit Axle

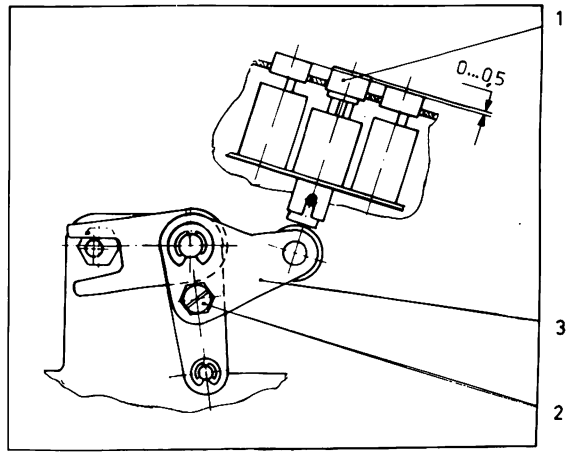
### 3.2.2. Tape Back Space Key for the Tape Punch

**Checking**

The upper face of the tape back space key (1) must be in the same plane as the adjacent key caps or project by a maximum of 0.5 mm above this plane.

**Adjusting**

After loosening screw (2) lever (3) resp. in RATIO version eccentric disk (4) is slued so that the tape back space key (1) is located in the plane of the adjacent keys or projects by a maximum of 0.5 mm above this plane.




### 3.2.3. Microswitch (End-of-Line Switch)

**Warning! See also adjustments 3.2.6., 3.2.13., 3.2.14., 3.2.15., 3.2.17., and the strap connections on PCB 37, transmitter control (Index 4).**

**Left-to-right printing direction**

**Checking**

1. There must be a clearance of 0.4 to 0.6 mm between the microswitch (2) and the carriage (1) of the printing unit (applicable for teleprinters which are set-up for 69 resp. 72 characters per line).
2. After completion of the 69th (72nd) feed step, the microswitch (2) must operate in the range 0 to 1.5 (1.4 to 2.0) mm, i.e. at the start of the 70th (73rd) feed step.

   At the same time, there must be a clearance of 1.5 to 2.1 (2.2 to 2.4) mm between the guide ring (4) and the stop screw (3) after completion of the 70th (72nd) feed step.

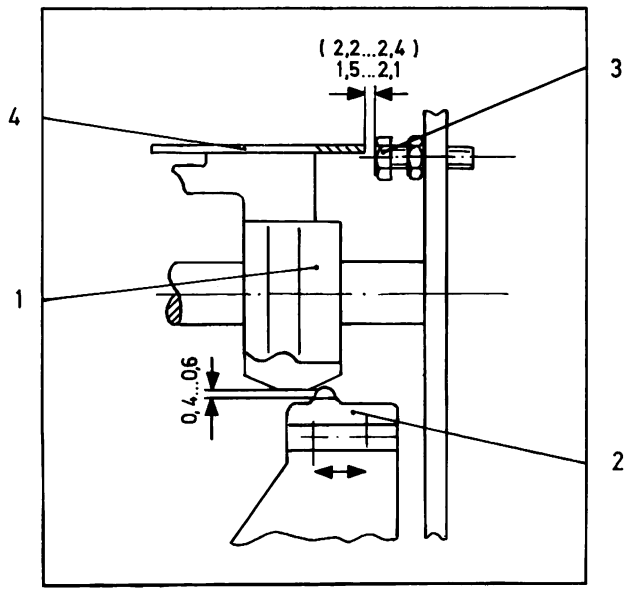
   The 70th feed step must be executed manually in case of teleprinters set-up for 69 characters per line.

**Adjusting**

1. First adjust the clearance of 0.4 to 0.6 mm between the microswitch (2) and the carriage (1) by means of the microswitch after loosening the two screws of the microswitch. Tighten the screws again.
2. Loosen the screws of the microswitch bracket and shift the bracket in its elongated holes until the required switching point is achieved. The measure of 0.4 to 0.6 mm must be retained. Tighten the screws again.

   Loosen the lock nut and adjust the required clearance to the guide ring (4) of 1.5 to 2.1 (2.2 to 2.4) mm with the stop screw (3), using a feeler gauge. Lock the stop screw (3) with the lock nut.

   *The measures in parentheses (1.4 to 2.0) and (2.2 to 2.4) are only valid for teleprinters with CR-LF automatic.*

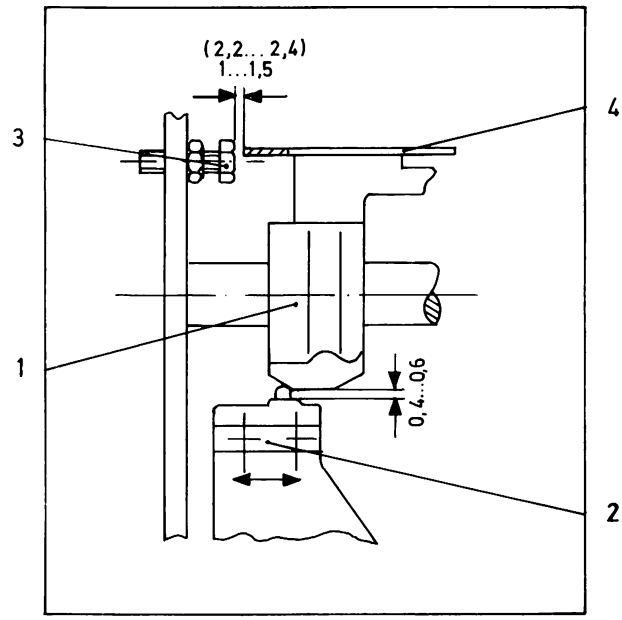


**Right-to-left printing direction**

**Checking**

1. There must be a clearance of 0,4 to 0,6 mm between the microswitch (2) and the carriage (1) of the printing unit.
2. After completion of the 69th feed step, there must be a clearance of 1.0 to 1.5 (2.2 to 2.4) mm between the guide ring (4) and the stop screw (3).

   During the following (70th) feed step the microswitch must operate in the range 0 to 1.2 (1.4 to 2.0) mm.



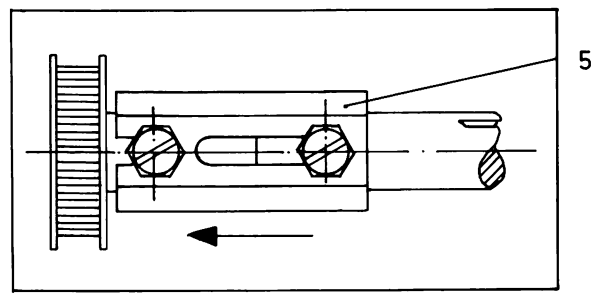

**Adjusting**

**Warning!** Prior to any adjustment check that the slotted sleeve (5) is mounted in such a way that it stops to the left in direction of the arrow.

1. First adjust the clearance of 0.4 to 0.6 mm between the microswitch (2) and the carriage (1) by means of the microswitch after loosening the two screws of the microswitch. Tighten the screws again.
2. Loosen the screws of the microswitch bracket and shift the bracket in its elongated holes until the required switching point is achieved. The measure of 0.4 to 0.6 mm must be retained. Tighten the screws again.

   Loosen the lock nut and adjust the required clearance to the guide ring (4) of 1.0 to 1.5 (2.2 to 2.4) mm with the stop screw (3), using a feeler gauge. Lock the stop screw (3) with the lock nut.

   *The measures in parentheses (1.4 to 2.0) and (2.2 to 2.4) are only valid for teleprinters with CR-LF automatic.*



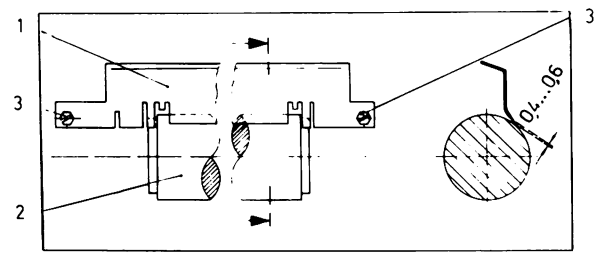

### 3.2.4. Paper Plate-to-Platen Clearance

**Checking**

The edge of the paper plate (1) must maintain a clearance of 0.4 to 0.6 mm from the platen (2) over its whole width.

**Adjusting**

After loosening the two hexagon head screws (3), adjust the required clearance of 0.4 to 0.6 mm using a feeler gauge. Tighten the hexagon head screws.



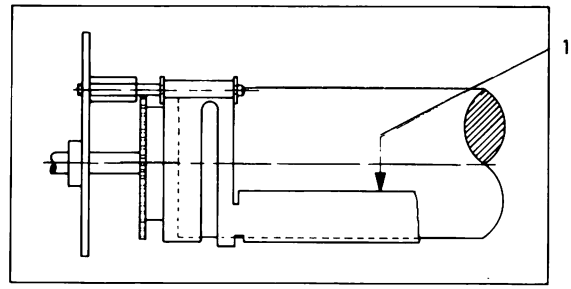
### 3.2.5. Parallelism between Paper Plate Edge and Platen

**Checking**

Viewed vertically from above, the paper plate edge (1) must be parallel to the platen.

**Adjusting**

Set-up the required parallel adjustment by adequately bending the plate by hand.




### 3.2.6. Paper Guide Plates

**Warning! See also adjustments 3.2.3., 3.2.13., 3.2.14., 3.2.15., 3.2.17., and strap connections on PCB 37, transmitter control (Index 4).**

**Checking**

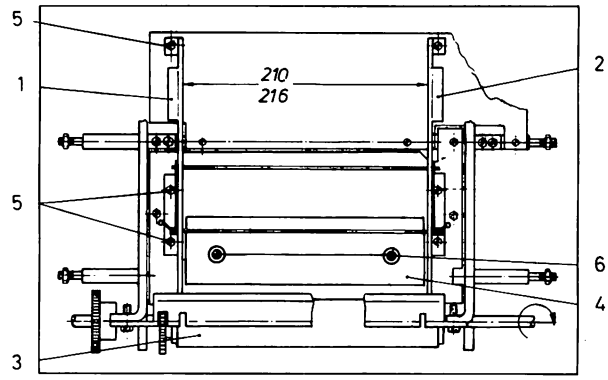
The cheek plates (1 and 2) must be parallel to each other and at right angles to the platen (3). The distance between both cheek plates is 210 mm for 69 characters per line and 216 mm for 72 characters per line. The guide plate (4) must be parallel to the platen (3).

**Adjustment**

After loosening the screws (5) of the left-hand cheek plate (1), adjust the cheek plate to an exact right angle with respect to the platen (3), using a try-square. Tighten the screws (5). The same operation is carried out for the right-hand cheek plate (2), additionally adjusting the plate distance of 210 or 216 mm.

The guide plate (4) is adjusted parallel to the platen (3) after loosening the two cheese head screws (6).

Measuring aid: Try-square.




For the following adjustments, remove the receiver from its housing. See section 3.1.1. for removal of the receiver.

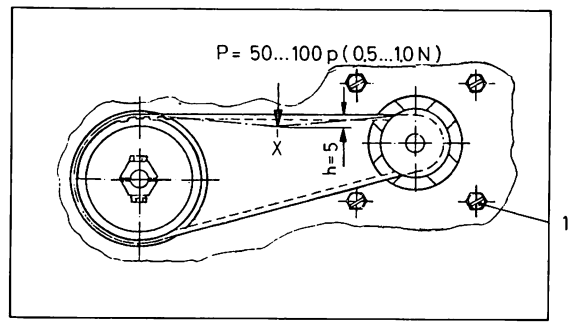
### 3.2.7. Motor Belt Tension

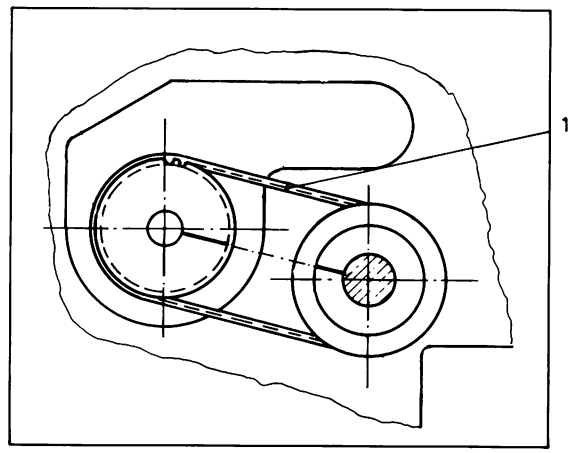
**Checking**

A force of 50 to 100 p (0.5 to 1.0 N) must deflect the toothed belt by 5 mm. Measuring point (×): In the center of the belt.

**Adjusting**

Loosen the motor fastening screws (1) and slide the motor in the appropriate direction. Tighten the fastening screws again.




### 3.2.8. Tape Punch

#### 3.2.8.1. Synchronization

When reinstalling the tape punch, it must be adjusted to a certain relative position with respect to the receiver. For this purpose, the locating marks on the two toothed belt pulleys must be aligned with each other prior to putting the toothed belt (1) on. In order to simplify this operation move the line feed lever to its rearmost position and stop it here with a screwdriver.

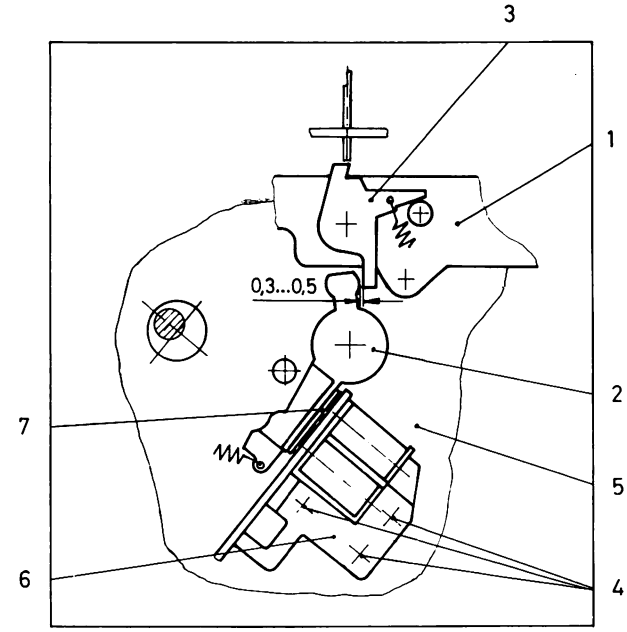
### 3.2.8.2. Adjustment of Magnetic Block (Below, St 13)

**Checking**

Turn drive shaft until rocking arm (1) reaches its bottom dead center. With the armatures in control member (2) being in plane-parallel contact with magnet yoke face, a 0.3-to-0.5-mm clearance must exist at the narrowest point between the control piece (3) arm and the control member (2) head.

**Adjusting**

After slackening the three securing nuts (4) **on the mounting plate** (5), the magnetic block (6) can be brought into a parallel with the armature face (7) while being simultaneously set to the 0.3-to-0.5-mm clearance required. On completion of adjusting, tighten nuts (4) on rear face.




### 3.2.8.3. Functional-Cam-to-Straightbar Clearance

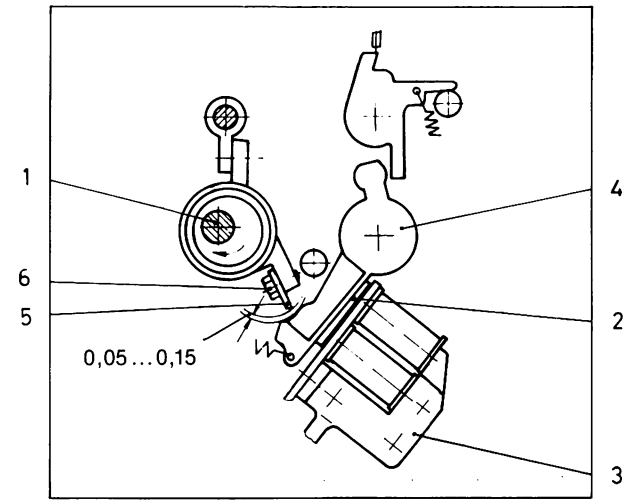
**Checking**

Turn drive shaft (1) until control member (2) armatures are closest to magnetic block (3) yokes. In this position, a 0.05-to-0.15-mm clearance must exist at the narrowest point between straightbar edge (5) and control member functional cams when pressing control members (4) by hand against magnetic block.

**Adjusting**

After slackening the two straightbar screws (6), adjust straightbar (5) to the 0.05-to-0.15-mm clearance required while maintaining parallelism with the functional cams.

Checking: When rotating the drive shaft by hand through a few full revolutions, no loss by friction is to make itself felt when the straightbar is passing by the functional cams.




### 3.2.8.4. Adjustment of Magnetic Block (Above, St 12)

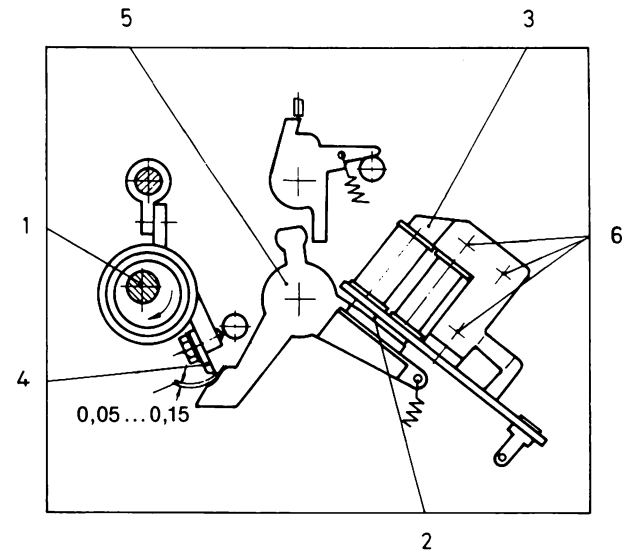
**Checking**

Turn drive shaft (1) until rocking arm reaches its bottom dead center. With the armatures (2) being in plane-parallel contact with magnet yoke face of magnetic block (3), a 0.05-to-0.15-mm clearance must exist at the narrowest point between straightbar (4) and control member (5) functional cams.

**Adjusting**

After slackening the three securing nuts (6) **on the mounting plate,** magnetic block (3) with its parallelism being maintained can be adjusted so that a 0.05-to-0.15-mm clearance is obtained between straightbar (4) and functional cams.

Checking: When rotating the drive shaft by hand through a few full revolutions, no loss by friction is to make itself felt when the straightbar is passing by the functional cams.



### 3.2.9. Color Ribbon Solenoid Coils

**Checking**

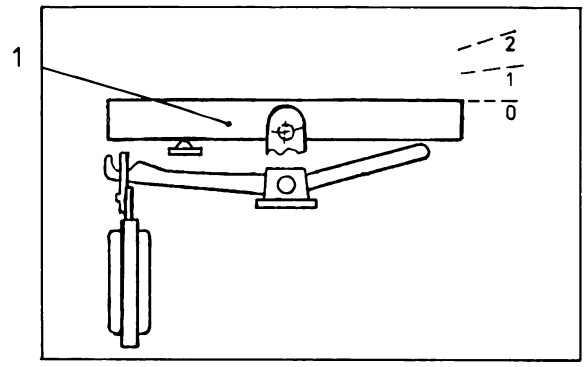
In local operation mode, check whether characters entered from the keyboard are printed completely in the correct color.

Cartridge position 1 (upper half of color ribbon):

Enter a series of characters g, p, q, f, l, t, ( ), several times. If the characters are printed in two colors, carry out the following adjustments.

Cartridge position 2 (lower half of color ribbon):

Likewise enter the above sequence of characters, at the same time pressing both solenoid armatures in the direction of the arrow. If the characters are printed in two colors, carry out the following adjustments.




**Adjusting**

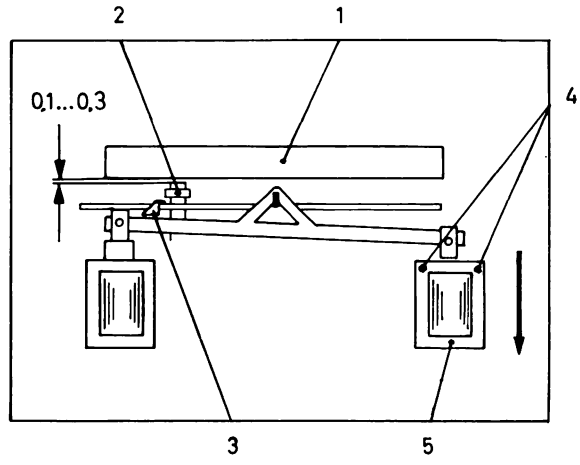
1. If the characters are printed in two colors in cartridge position 1, loosen the two hexagonal nuts (4) of the solenoid coil (5) so that the solenoid can still be moved by hand:
   - Adjust the solenoid coil (5) so that the characters are printed completely in the color of the upper half of the color ribbon. In case of characters with white tops: slide solenoid coil (5) towards the base of the frame.

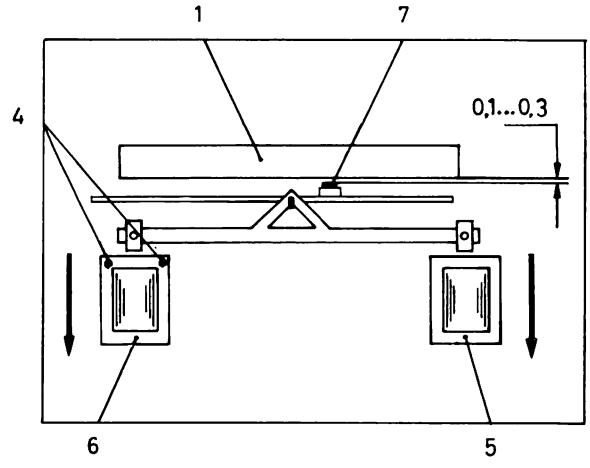
     In case of characters with lower ends which are in the other color: slide solenoid coil (5) towards the cartridge (1).
   - A clearance of 0.1 to 0.3 mm must exist between the stop (2) and the cartridge (1).
   - After this, check the printing in cartridge position 2.
2. In the case of two color printing in cartridge position 2, loosen the two hexagonal nuts (4) of solenoid coil (6) so that the solenoid can still be moved by hand:
   - Adjust the solenoid coil (6) so that the characters are printed completely in the color of the lower half of the color ribbon.

     In case of characters with tops of a different color to the rest of the character: slide solenoid coil (6) towards the base of the frame.

     In case of characters with white bottoms: slide solenoid coil (6) towards the cartridge (1).
   - A clearance of 0.1 to 0.3 mm must exist between the stop (7) and the cartridge (1).
   - After this, check the printing in cartridge position 1.

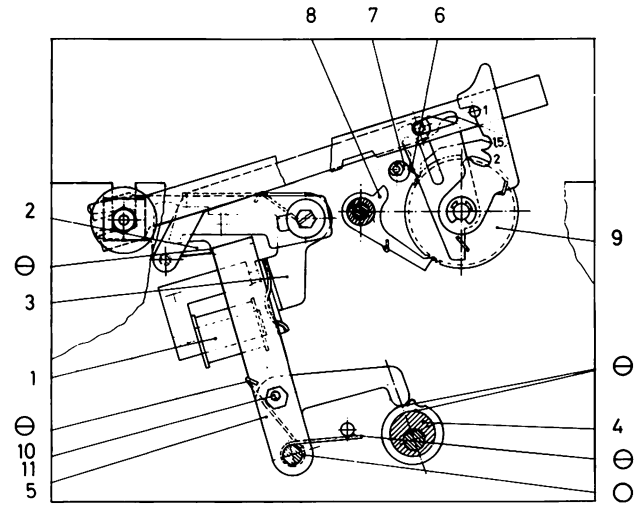
   After checking the armatures for free movement, tighten the hexagonal nuts (4).




The yoke of the left solenoid coil is also the bearing of the pawl torsion spring. For this reason, function of the pawl (3) must be checked after carrying out the above adjustment.

### 3.2.10. Line Feed Bracket




**Checking**

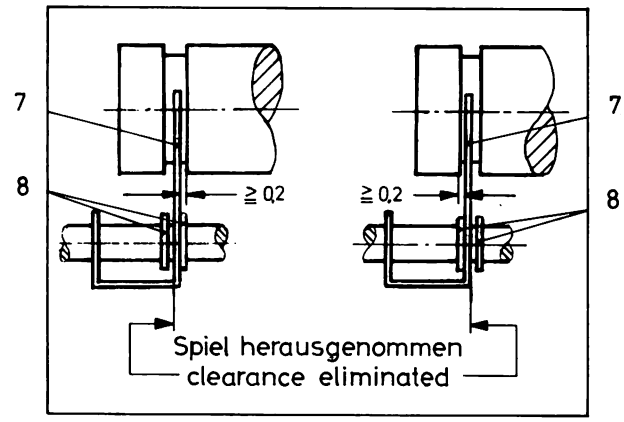
The functional check must be carried out with the paper guide still fitted. Press the bracket (3) against the yoke (1) of the line feed magnet by hand, thus releasing the pawl (2). Move the bracket (5) to its rearmost position by turning the drive shaft (4). Before reaching its final position, bracket (5) moves the pawl (2), thus executing a line feed. In the rearmost position, the pawl (6) must be in contact with the eccentric sleeve (7) and the detent pawl (8) must have engaged correctly in the base of a tooth of the ratchet wheel (9).

**Adjusting**

When fitting a new line feed bracket, remove the paper guide and the tape cartridge.

After fitting the line feed bracket, do not completely tighten the eccentric screw (10) and nut (11). Fit and screw down the paper guide. Press the bracket (3) against the yoke (1) of the line feed magnet by hand. Move the bracket (5) to its rearmost position by turning the drive shaft (4). Turn the eccentric screw (10) until the pawl (6) touches the eccentric sleeve (7) and the detent pawl (8) has engaged correctly. Move the line feed bracket to the foremost position by turning the drive shaft (4) further. After again pressing the bracket (3) against the yoke (1) of the line feed magnet, check whether pawl (2) is released and can be moved by bracket (5); otherwise turn the eccentric screw (10) backwards until the pawl (2) can engage correctly. Lock the eccentric screw (10) with nut (11).

### 3.2.11. End-of-Paper Contact




**Checking**

To check this contact, insert a teleprinter paper, turn the platen until the end of the paper has passed the feeler (7). The feeler must drop reliably into the slot on the platen (clearance from the slot edges on each side ≧ 0.2 mm) and must operate the microswitch (4). (Microswitch opens).

With teleprinter paper inserted, the feeler (7) must lie lightly on the paper and must operate the microswitch reliably (Safety overtravel 0.2 to 0.4 mm).

**Adjusting**

— Remove the teleprinter paper

— Adjust the feeler (7), by bending it, so that it has a clearance of ≧ 0.2 mm from the edges of the slot throughout a complete rotation of the platen.

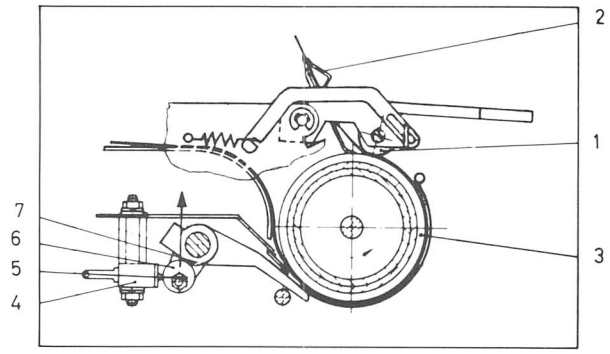
**Warning!** The feeler has a clearance between both retaining washers (8). Cancel the clearance.

— After loosening the hexagonal nut (5), adjust the eccentric cam (6) by turning so that it touches the nipple stud of the microswitch (4). The projecting part of the eccentric cam (6) must point in the direction of the arrow. Slightly lock the eccentric cam (6) with the hexagonal nut (5)

— Insert teleprinter paper. Turn the excentric cam (6), if necessary, so that the microswitch is operated reliably (safety overtravel 0.2 to 0.4 mm) and the feeler still lies lightly on the teleprinter paper

— After this, check again that the microswitch operates reliably at the end of the paper

— Securely lock the eccentric cam (6) with the hexagonal nut (5).




### 3.2.12. Backlash on the Feed Gear

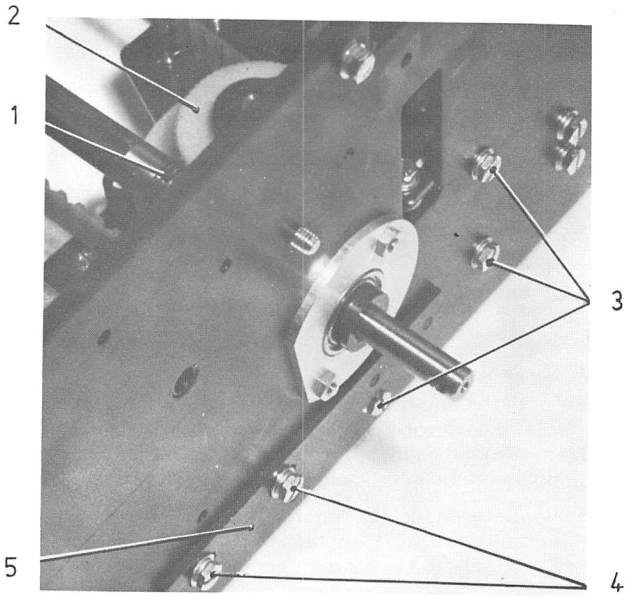
This adjustment is not necessary for Feed Gears, functional issue F 02.

**Checking**

A slight palpable backlash must be present between the worm (1) and the worm wheel (2) around the whole circumference of the worm wheel.

**Adjusting**

Loosen the three fastening screws (3) and the fastening screws (4) on plate (5). After shifting the feed gear, tighten all fastening screws again.



### 3.2.13. Stepping Mechanism

**Checking**

For checking, move the printing unit into the start-of-line position. In this position, the detent pawl (1) must lie within the range of 0.1 mm before to 0.1 mm after the vertical flank of the rotor tooth (2) which is positioned closest to the detent pawl (1).

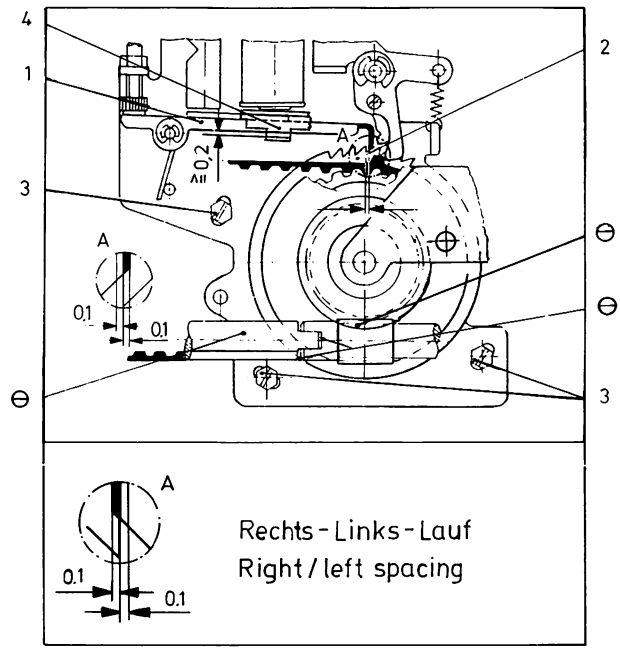
At the same time there must be a clearance of ≥ 0.2 mm between the detent pawl (1) and the stop bracket (4).

**Adjusting**

After loosening the three fastening screws (3) turn the stepping mechanism as far as detent pawl (1) has reached the required position to the rotor tooth (2). Tighten the screws (3) again.

If the required regulating range for adjusting the stepping mechanism is not adequate, move the clamping piece as compensation in the corresponding direction (see section 3.2.17.) and repeat the adjustment.

Subsequently adjust the clearance of ≥ 0.2 mm between the detent pawl (1) and the bracket (4).




### 3.2.14. Clearance between Trip Cam and Arresting Pawl

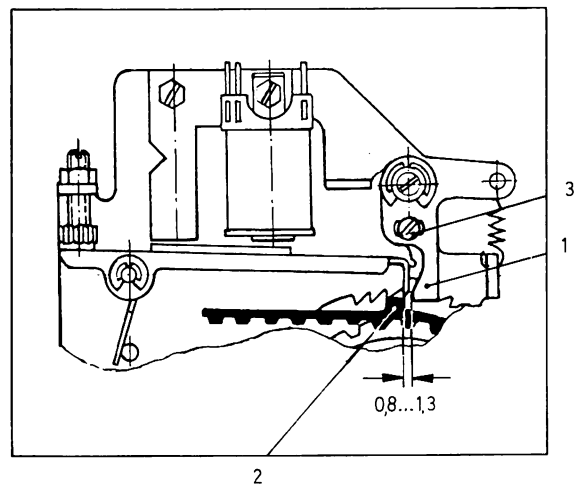
**Left-to-right printing direction**

**Checking**

For checking, move the printing unit one print position to the right out of the start-of-line position (second character of a line). In this position, there must be a clearance of 0.8 to 1.3 mm between the trip cam (2) of the toothed belt and the arresting pawl (1).

**Adjusting**

Loosen the adjusting screw (3) of the arresting pawl (1) and adjust the pawl to the required clearance of 0.8 to 1.3 mm. Tighten screw (3) again.



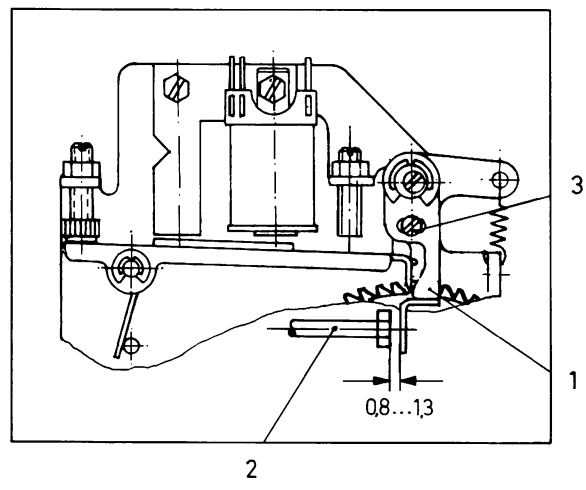

**Right-to-left printing direction**

**Checking**

For checking, move the printing unit one print position to the left out of the start-of-line position (second character of a line). In this position, there must be a clearance of 0.8 to 1.3 mm between the stop screw (2) of the carriage and the arresting pawl (1).

**Adjusting**

Loosen the adjusting screw (3) of the arresting pawl (1) and adjust the pawl to the required clearance of 0.8 to 1.3 mm. Tighten screw (3) again.



For the following adjustments, remove the printing unit from the teleprinter. See section 3.1.7. for removal.

### 3.2.15. Carriage Stops

**Warning!** See also adjustments 3.2.3., 3.2.6., 3.2.13., 3.2.14., 3.2.17., and strap connections on PCB 37, transmitter control (Index 4).

#### Left-to-right printing direction

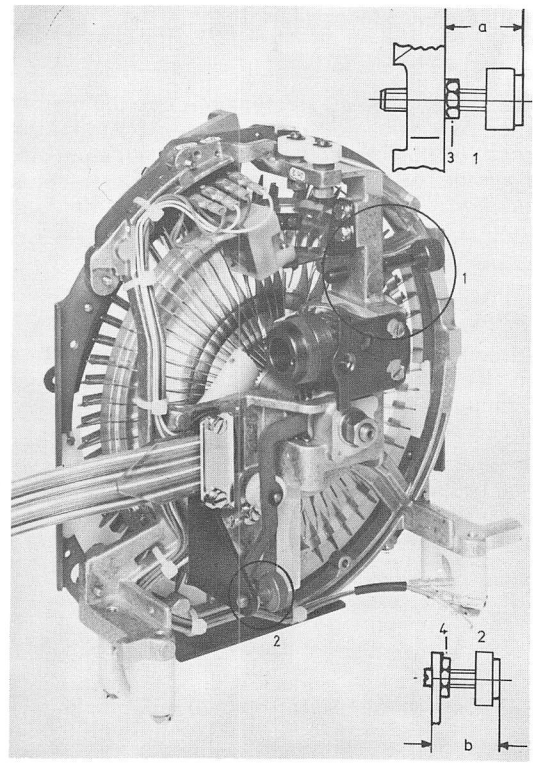
#### Checking

In order to properly activate the microswitch in the start-of-line position of the printing unit, the stop (1) has to be adjusted to dimension a. The stop (2) has to be adjusted to dimension b. After the printing unit has been mounted in the frame, it is necessary to check that in the start-of-line position there is a clearance of ≈ 1 to 2 mm between the piston rod (6) and the cylinder head (5) of the dashpot cylinder.

#### Adjusting

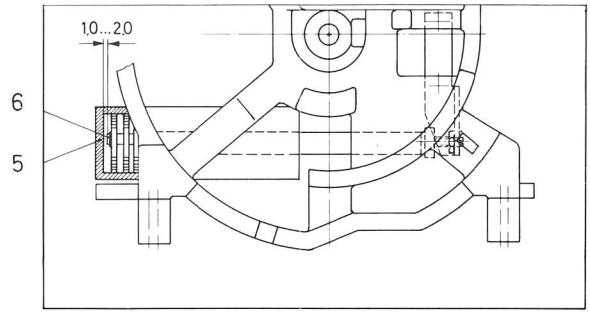
Adjust stop (1) to dimension a and lock it with nut (3). Stop (2) is first adjusted to dimension b.

After mounting the printing unit in the frame, adjust stop (2) with the printing unit in the start-of-line position to the required clearance of ≈ 1 to 2 mm between the piston rod (6) and cylinder head (5) of the dashpot cylinder.




Adjusting dimensions:

| Characters / Line | Roll Paper | Form Paper | Stop 1 Dimension a (mm) | Stop 2 Dimension b (mm) | Distance between End of Paper and First Character (Center) (mm) |
|---|---|---|---|---|---|
| 69/104 | × | | 35,1 | 12,7 | 22,8 |
| 69 | | × | 35,1 | 12,7 | 22,8 |
| 72 | × | | 30 | 7,6 | 17,7 |




The nut (4) is moved outwards for 72 characters / line

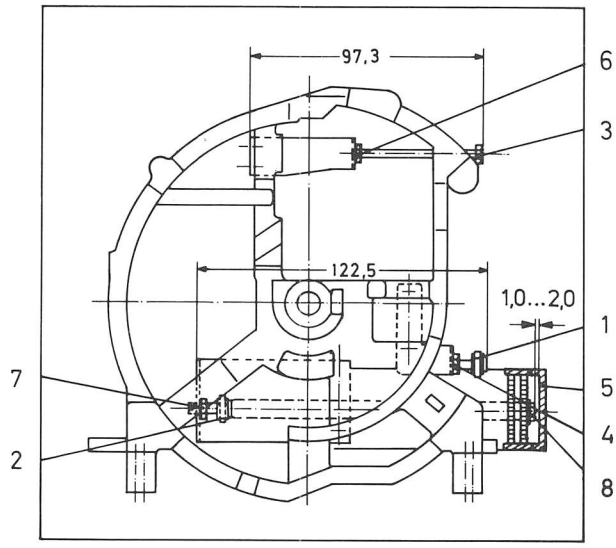
#### Right-to-left printing direction

#### Checking

In order to properly activate the microswitch in the start-of-line position of the printing unit, the stop (1) has to be adjusted to a dimension of 122,5 mm, the stop (3) has to be adjusted to a dimension of 97,3 mm. After the printing unit has been mounted in the frame, it is necessary to check that in the start-of-line position there is a clearance of ≈ 1 to 2 mm between the piston rod (8) and the cylinder head (5) of the dashpot cylinder.

#### Adjusting

Adjust stop (1) to a dimension of 122.5 mm and lock with nut (4). Adjust stop (3) to a dimension of 97.3 mm and lock with nut (6). After mounting the printing unit in the frame, adjust stop (2) with the printing unit in the start-of-line position to the required clearance of ≈ 1 to 2 mm between the piston rod (8) and cylinder head (5) of the dashpot cylinder. Lock with nut (7).



### 3.2.16. Toothed Feed Belt

Three different adjustments are necessary for correct running of the toothed feed belt:

— Belt tension
— Parallel adjustment
— Central running.

Prior to starting the adjustments:

— Hold the toothed belt (1) and release the detent pawl (2)
— Release tension of the toothed belt by hand until the key head (3) is in contact with the shaped piece (4).

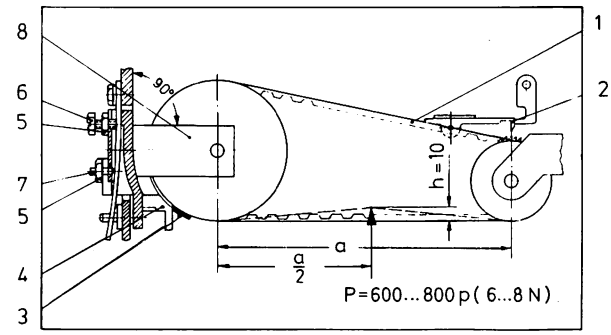
#### 3.2.16.1. Belt Tension

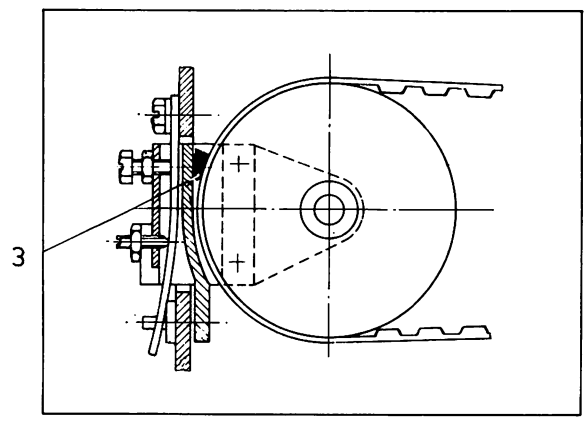
**Checking**

A force of 600 to 800 p (6 to 8 N), applied approximately in the center or the toothed belt (1), should depress the belt by 10 mm.

**Adjusting**

After loosening the lock nuts (5), adjust the belt tension with the two hexagon head screws (6) and the grub screw (7). Take care that the edge of the bracket (8) forms an angle of 90° with the side wall. Tighten lock nuts (5) again.




Right-to-left printing direction

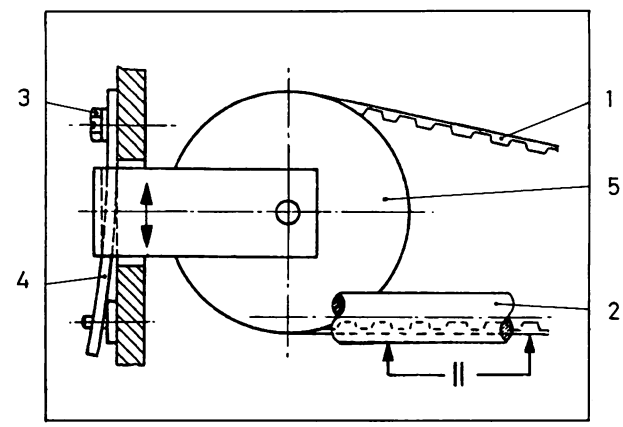
#### 3.2.16.2. Parallel Adjustment

**Checking**

The toothed feed belt (1) must be parallel with the drive shaft (2).

**Adjusting**

After loosening the screw (3), adjust the plate (4) and the carriage return drum (5) so that the required parallel adjustment is achieved. Tighten screw (3) again.



### 3.2.16.3. Central Running

For this adjustment, install the printing unit (section 3.1.7.)

**Checking**

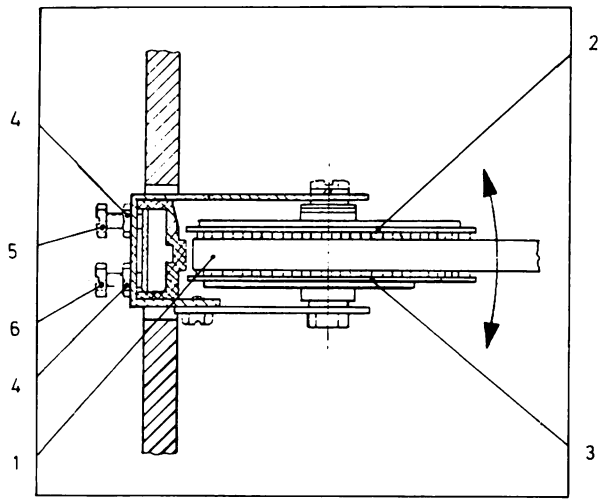
Disengage the detent pawl of the feed gear, holding the printing unit with one hand. Keeping the pawl disengaged, move the printing unit to and fro. During this motion, the toothed belt must not run out towards the flanges of the pulley (2 and 3).

**Adjusting**

After loosening the two lock nuts (4), adjust the adjusting screws (5 and 6) as follows:

If the toothed belt moves upwards towards the flange (2), screw out screw (6) slightly and screw in screw (5) by the same amount in order to maintain the belt tension. If the belt moves towards the flange (3), proceed in reverse order.

If after a trial no further adjustment is necessary, tighten the two lock nuts (4).




### 3.2.17. Fitting the Clamping Piece on the Toothed Feed Belt

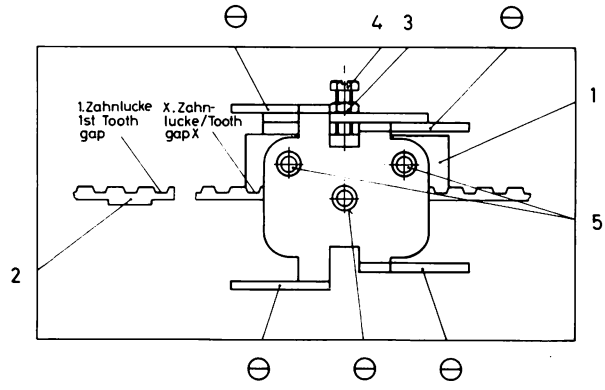
**Warning!** See also adjustments 3.2.3., 3.2.6., 3.2.13., 3.2.14., 3.2.15., and strap connections on PCB 37, transmitter control (Index 4).

**Left-to-right printing direction**

**Checking**

Depending on the selected line length, the left tooth of the clamping piece (1) must be inserted in the following tooth gap after the nose (2) of the toothed belt.

| Teleprinter Version | Tooth Gap × | Edge Spacing to First Character (Center) (mm) |
|---|---|---|
| 69 or 104 characters/line (roll paper or form paper) | 4 | 22.8 |
| 72 characters/line (roll paper) | 3 | 17.7 |




**Adjusting**

After loosening the lock nuts (3), loosen the hexagon head screws (4 and 5). Position the clamping piece according to the teleprinter version, as specified in the Table. After slightly tightening the screw (4), and correctly adjusting the clamping piece, the screw (5) can be tightened and screw (4) can be locked.

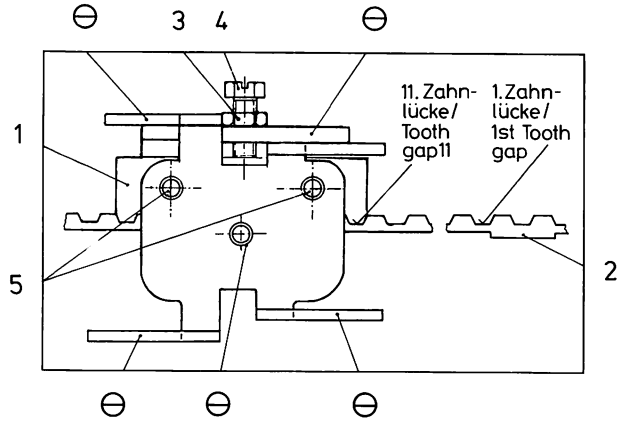
**Right-to-left printing direction**
(Line length 69 characters/line

**Checking**

The right tooth of the clamping piece (1) must be inserted in the 11th tooth gap after the nose (2) of the toothed belt.

**Adjusting**

After loosening the lock nut (3), loosen the hexagon head screw (4 and 5). Position the clamping piece into the 11th tooth gap after the nose (2). After slightly tightening the screw (4), and correctly adjusting the clamping piece, the screw (5) can be tightened and screw (4) can be locked.



# 4. STRAP MODIFICATIONS AND MEASURING POINTS

**CONTENTS** Page


**Printed Circuit Board LP 5**..... 4 — LP 5

**Printed Circuit Board LP 6**..... 4 — LP 6

**Printed Circuit Board LP 7**..... 4 — LP 7

**Printed Circuit Board LP 8**..... 4 — LP 8

**Printed Circuit Board LP 9**..... 4 — LP 9

**Printed Circuit Board LP 12**..... 4 — LP 12

**Printed Circuit Board LP 15**..... 4 — LP 15

**Printed Circuit Board LP 16**..... 4 — LP 16

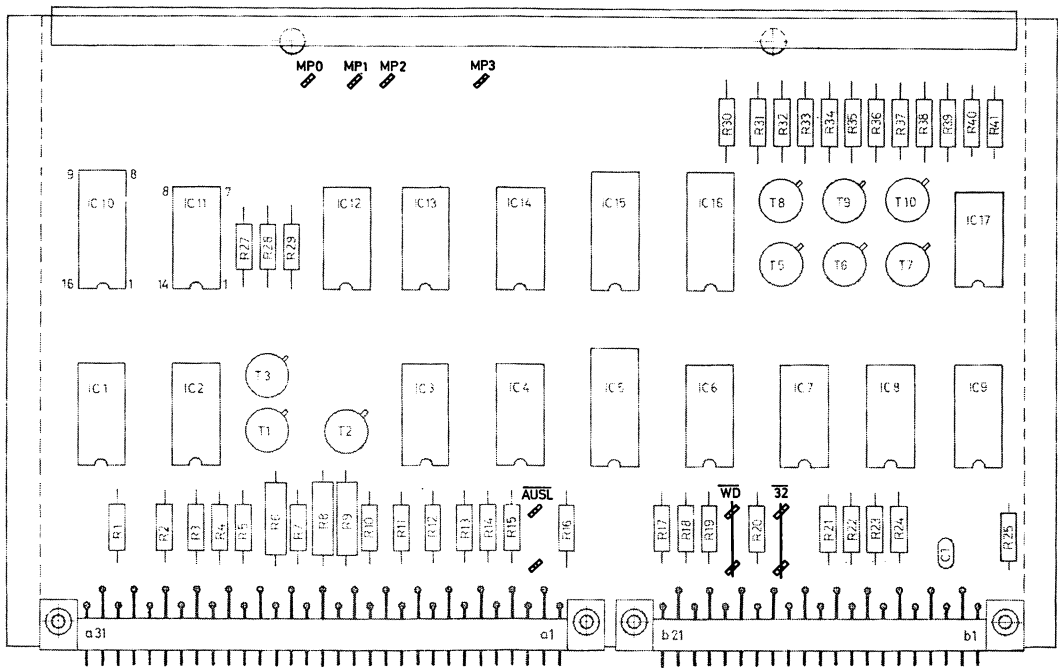
**Printed Circuit Board LP 37**..... 4 — LP 37

**Printed Circuit Board LP 38**..... 4 — LP 38


Note:

A ≙ Functional issue
× ≙ Strap inserted
Order No. ≙ Part No.

## LP 5 Tape Punch Control 57012 15150 A 01




Measuring Points:

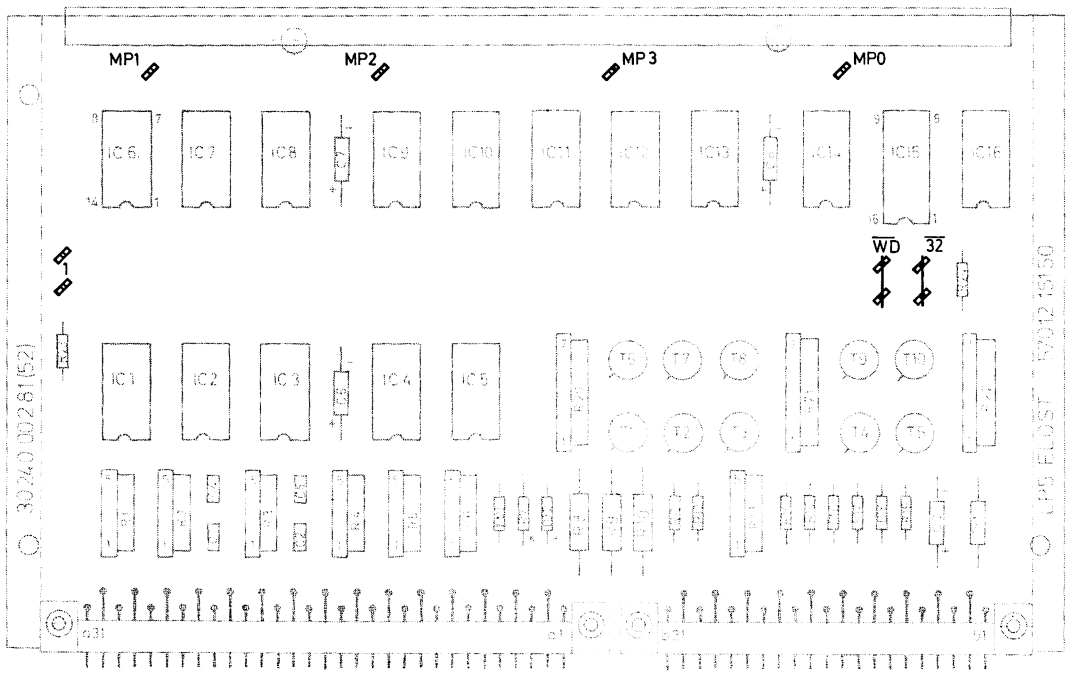
MP 0: 0 V
MP 1: Release pulse for energizing the tape punch feed magnet synchronized with zero pulse
MP 2: Signal "tape punch ON"
MP 3: Signal "Energizing of tape punch feed magnet" (MT)

Straps:

| Version (Order No.) | Mode of Operation[1]) | Straps | | |
|---|---|---|---|---|
| | | $\overline{32}$ | $\overline{WD}$ | $\overline{AUSL}$ |
| 57012 15150 | 32nd combination and Who Are You combination are not punched | × | × | |
| 57012 15152 | 32nd combination is punched | | × | |
| 57012 15153 | 32nd combination and Who Are You combination are punched | | | |
| 57012 15154 | Who Are You combination is punched | × | | |

[1]) For teleprinters with a character set of 96 characters (3 shift):
Notice the varied arrangements of straps on PCB 9, Printing Unit Control, for shifting into 3rd shift.

## LP 5 Tape Punch Control 57012 15150 A02




Measuring Points:

MP 0: 0 V
MP 1: Release pulse for energizing the tape punch feed magnet synchronized with zero pulse (NIG 2)
MP 2: Signal "Tape punch ON"
MP 3: Signal "Energizing of tape punch feed magnet" (MT)

Straps:

| Version (Order No.) | Mode of Operation[1]) | Straps | | |
|---|---|---|---|---|
| | | $\overline{32}$ | $\overline{WD}$ | 1[2]) |
| 57012 15150 | 32nd combination and "Who Are You" combination are not punched | × | × | |
| 57012 15152 | 32nd combination is punched | | × | |
| 57012 15153 | 32nd combination and "Who Are You" combination are punched | | | |
| 57012 15154 | "Who Are You" combination is punched | × | | |

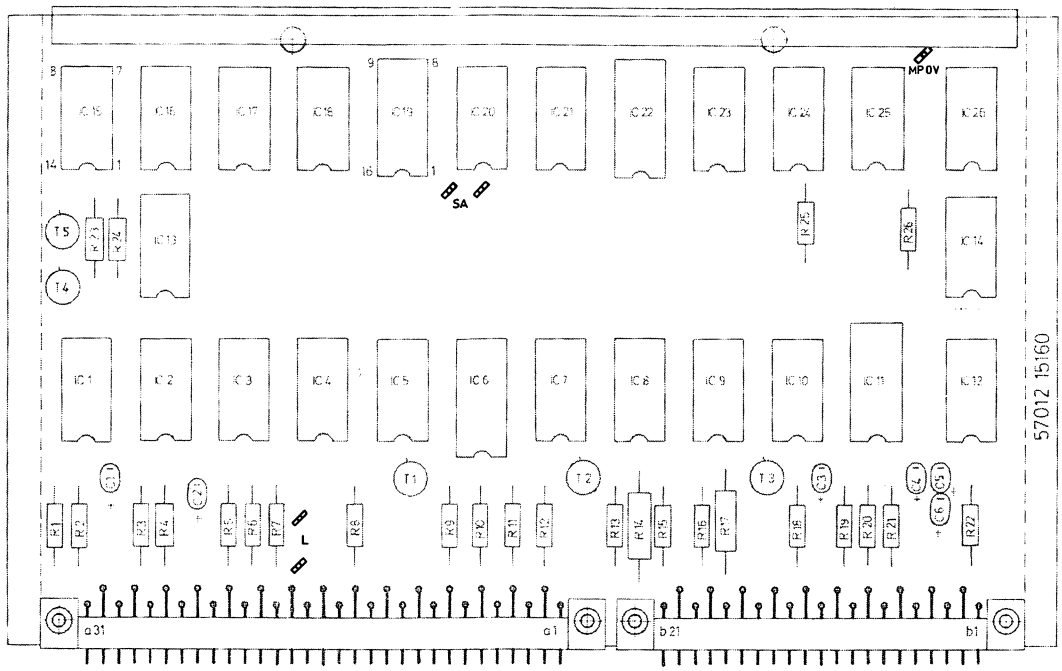
Note:

[1]) For teleprinters with a character set of 96 characters (3 shift): Notice the varied arrangements of straps on PCB 9, Printing Unit Control, for shifting into 3rd shift.

[2]) Strap 1 for tape run out (V) and BAW:
inserted: 4 times punched combination "32"
not inserted: 4 times punched combination "Ltrs"

N/A

**LP 6 Subscriber Unit 1 57012 15160 A 01**

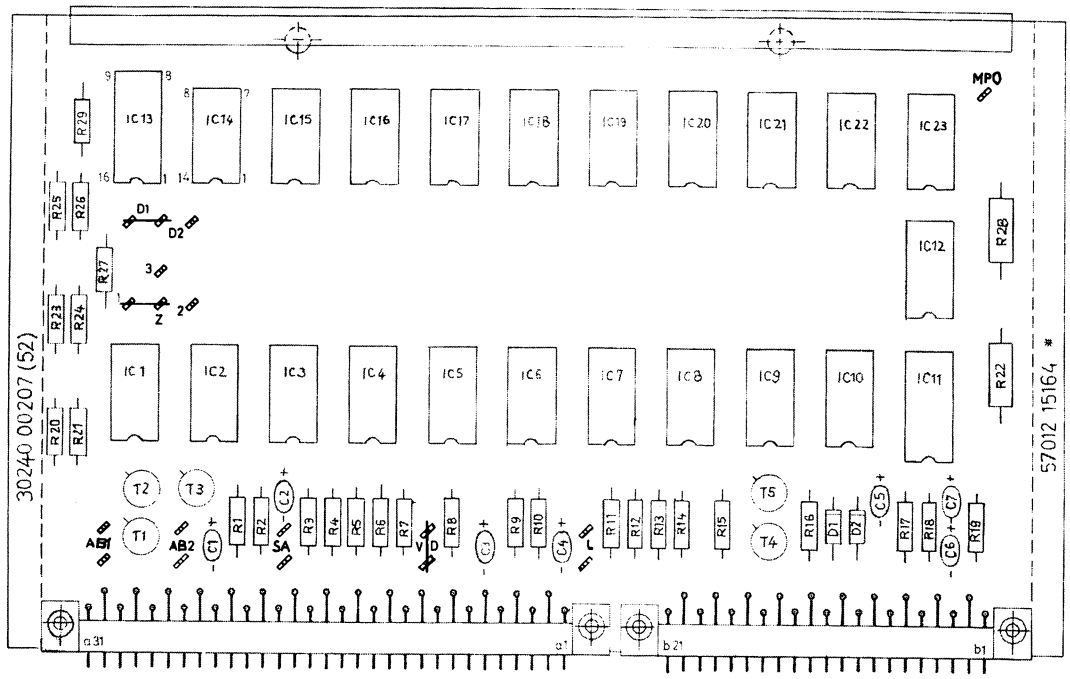



Measuring Point:
MP 0: 0 V

Straps:

| Version (Order No.) | Mode of Operation | Straps | |
|---|---|---|---|
| | | L | SA |
| 57012 15160 | German Telex | | |
| | End-of-paper contact is effective in local operation too, additionally to telex operation | × | |
| | At end of paper no calling from outside is possible with collective connection | | × |

**LP 6 Subscriber Unit 1 57012 15164 A 01**




Straps:

| Version (Order No.) | Straps | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AB 1 | AB 2 | D 1 | D 2 | L | SA | VD | Z 1 | Z 2 | Z 3 |
| 57012 15164 | | | × | | | | × | × | | |

Strap AB 1 inserted:
for ED 1000 systems with SEU-B and B-signalling

Strap AB 2 inserted:
for double-current systems with A-signalling

Strap AB 1 and AB 2 not inserted:
Mode set by replacement of line adaptation

Strap D 1 inserted:
105 ms switch-overtime in double-current systems and B-signalling

Strap D 2 inserted:
425 ms switch-overtime in double-current systems and B-signalling

Strap D 1 and D 2 not inserted:
no switch-overtime in double-current systems

Strap L inserted:
End-of-paper contact active at local operation too

Strap L not inserted:
End-of-paper contact not active at local operation

Strap SA inserted:
for subscriber with collective numbers

Strap SA not inserted:
for subscribers with exclusive exchange line

Strap VD inserted:
Half Duplex

Strap VD not inserted:
Full Duplex

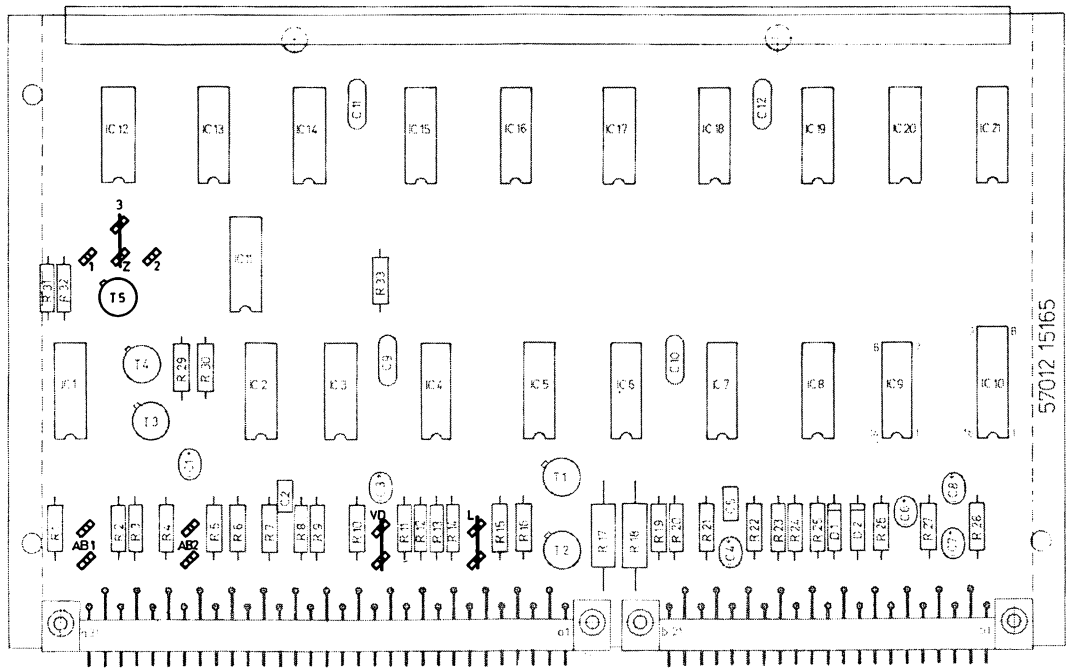
Strap Z 1 inserted:
$\overline{\text{BAW}}$ approx. 2.9 s

Strap Z 2 inserted:
$\overline{\text{BAW}}$ approx. 1.5 s

Strap Z 3 inserted:
$\overline{\text{BAW}}$ approx. 900 ms

Strap Z 1, Z 2, Z 3 not inserted:
$\overline{\text{BAW}}$ approx. 300 ms

**LP 6 Subscriber Unit 1 57012 15165 A 02**

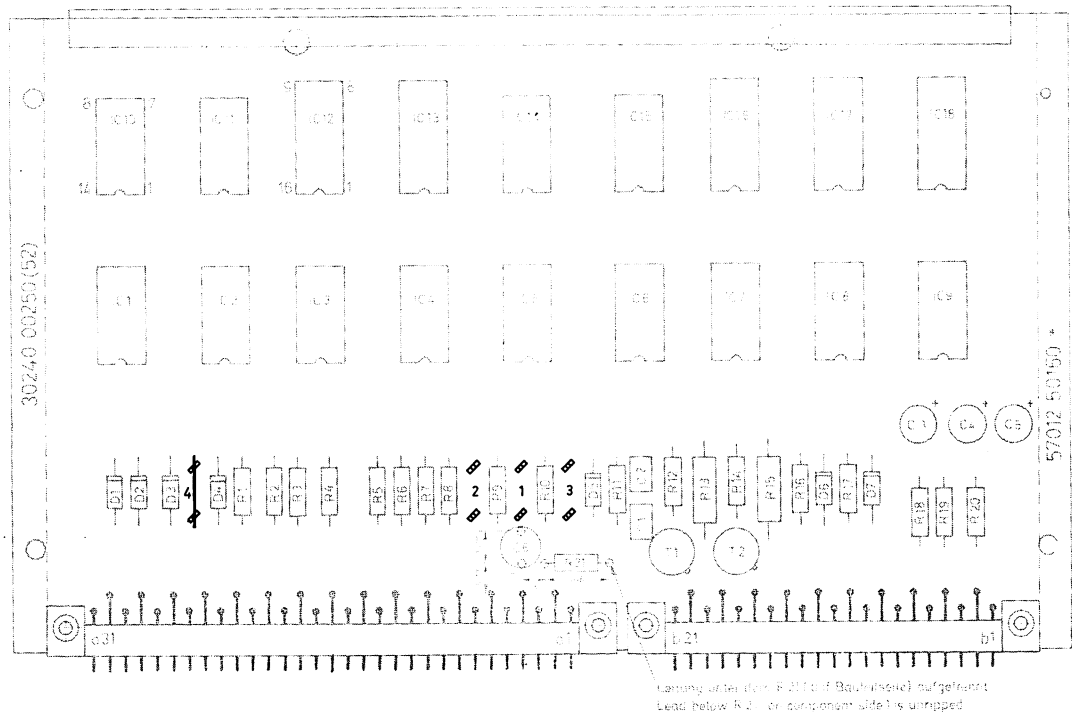



Straps:

| Version (Order No.) | Straps | | | | | | |
|---|---|---|---|---|---|---|---|
| | AB1 | AB2 | L | VD | Z1 | Z2 | Z3 |
| 57012 15165 | | | × | × | | | × |

| | |
|---|---|
| Strap "AB 1" inserted: | ED 1000 systems with SEU-B and B-signaling |
| Strap "AB 2" inserted: | Polar direct current systems with A-signaling |
| Strap "AB 1" and "AB 2" not inserted: | Mode set by replacing the line adaptation |
| Strap L inserted: | End-of-paper contact active at local operation |
| Strap L not inserted: | End-of-paper contact not active at local operation |
| Strap VD inserted: | Half duplex |
| Strap VD not inserted: | Full duplex |
| Strap Z1 inserted: | $\overline{\text{BAW}}$ approx. 2.9 s |
| Strap Z2 inserted: | $\overline{\text{BAW}}$ approx. 1.5 s |
| Strap Z3 inserted: | $\overline{\text{BAW}}$ approx. 900 ms |
| Straps Z1, Z2, Z3 not inserted: | $\overline{\text{BAW}}$ approx. 300 ms |

## LP 6 Interface V. 24 MODEM/DATEX 57012 50160 A 01



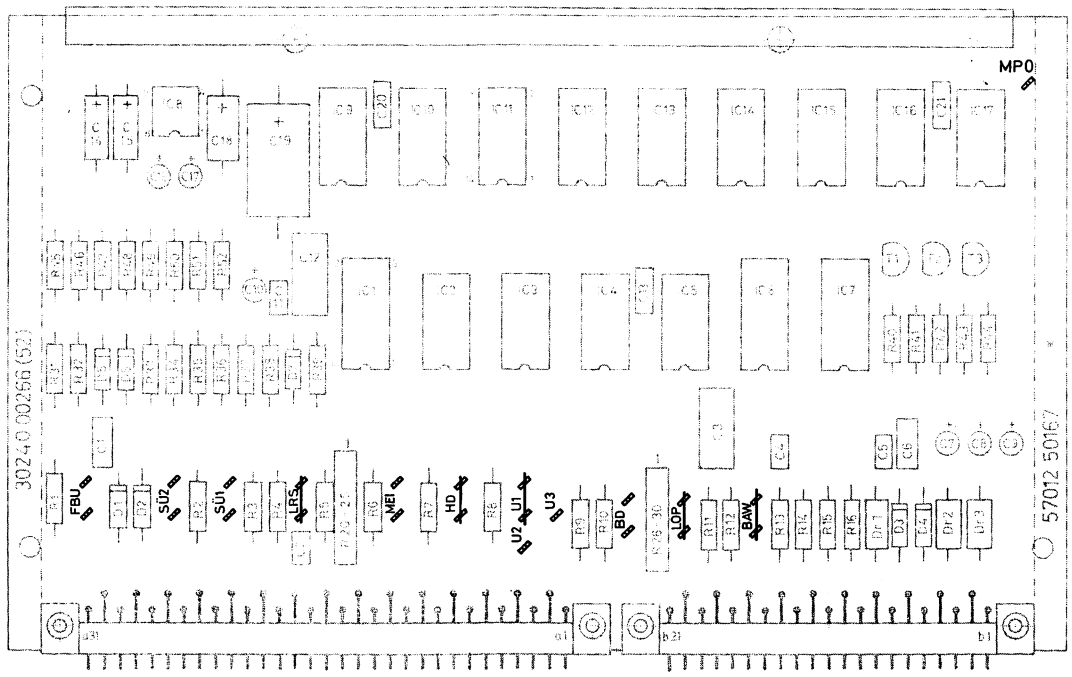

Lead below R21 (on component side) is ~~unripped~~ CUT (open cct to include R21)

Straps:

| Version (Order No.) | Straps 1 | 2 | 3 | 4 | Mode of Operation |
|---|---|---|---|---|---|
| 57012 50160 | | | | × | Interface V. 24 DATEX |
| 57012 51160 | × | × | | × | Interface V. 24 MODEM (for MODEM connection by means of telephone *with* data key) |
| 57012 50163 | × | × | × | × | Interface V. 24 MODEM (for MODEM connection by means of telephone *without* data key) |

Strap 4 is to be removed for duplex operation.

## LP 6 Subscriber Unit 1 STmL 57012 50167 A01




Measuring Point:
MP 0 = 0 V

Straps:

| Version Order No. | Straps | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | U1 | U2 | U3 | FBU | SÜ1 | SÜ2 | HD | BD | MEI | BAW | LOP | LRS |
| 57012 50167 | × | | | | | | × | | | × | × | × |
| 57012 51167 | × | | | | | | × | × | | × | × | |
| 57012 52167 | | | × | | | | | | | × | × | × |
| 57012 53167 | | | | | | | | | | | × | × |
| 57012 54167 | × | | | | | | × | | | × | | × |
| 57012 55167 | | | | | | | | | | × | × | |
| 57012 56167 | | | | | × | × | | | | | × | |

LP 6 Subscriber Unit 1 STmL 57012 50167 A01

Brückenkombinationen / Strap Combinations:
(× ≙ Brücke eingelegt / × ≙ Strap inserted)

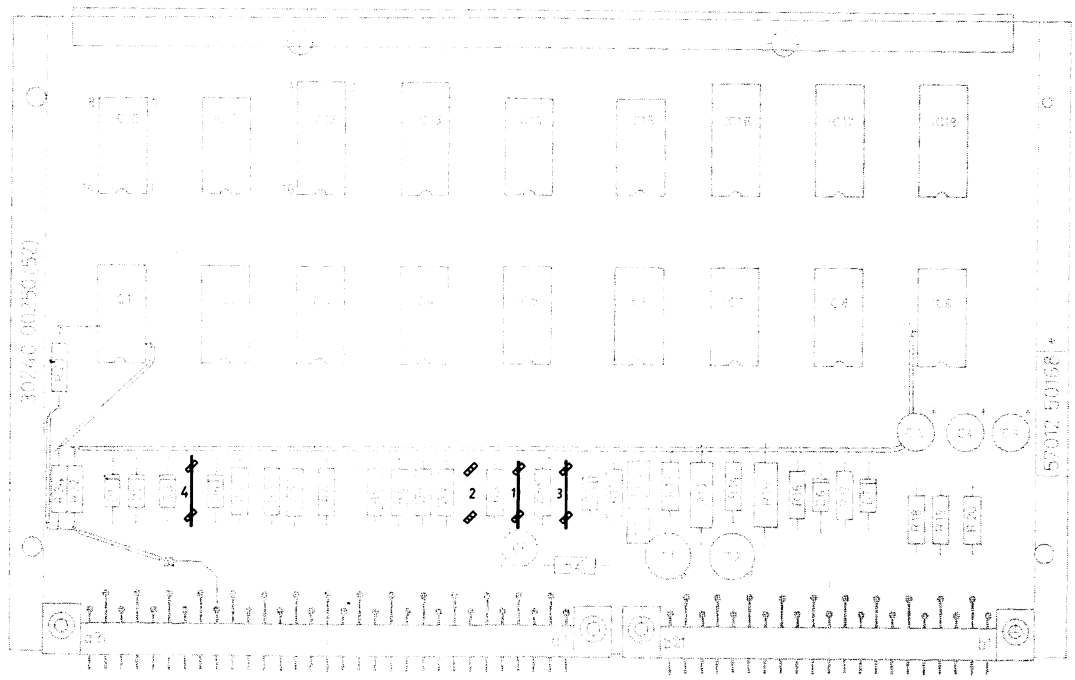
| Farbbandsteuerung / Color ribbon control | | | | |
|---|---|---|---|---|
| Brücken / Straps | | | | Funktion / Function |
| U1 | U2 | U3 | FBU | |
| | | | | Dauernd untere Farbbandhälfte / Continuously lower color ribbon half |
| | | × | | Dauernd obere Farbbandhälfte / Continuously upper color ribbon half |
| | | × | × | Externe Farbbandsteuerung / External color ribbon control |
| × | | | | Automatische Farbbandsteuerung bei HD Half Duplex<br>Sendebetrieb ≙ obere Farbbandhälfte; Empfangsbetrieb ≙ untere Farbbandhälfte<br>Automatic color ribbon control during HD<br>Transmit operation ≙ upper color ribbon half; Receive operation ≙ lower color ribbon half |
| | × | | | Automatische Farbbandsteuerung bei HD<br>Sendebetrieb ≙ untere Farbbandhälfte; Empfangsbetrieb ≙ obere Farbbandhälfte<br>Automatic color ribbon control during HD<br>Transmit operation ≙ lower color ribbon half; Receive operation ≙ upper color ribbon half |

Leitungsüberwachung / Line Monitoring

| Brücken / Straps | | Funktion / Function |
|---|---|---|
| SÜ1 | SÜ2 | |
| × | | Blinken der Anzeige hinter der Anruftaste und Summer-Signal bei Leitungsunterbrechung<br>Flashing of the indication behind the call button and buzzer signal when line interruption |
| | × | »Motor aus« bei Leitungsunterbrechung<br>"Motor OFF" when line interruption |
| × | × | Blinken, Summer-Signal und »Motor aus« bei Leitungsunterbrechung<br>Flashing, buzzer signal and "Motor OFF" when line interruption |
| nicht eingelegt<br>not inserted | | Keine Leitungsüberwachung<br>No line monitoring |

| |
|---|
| HD eingelegt / inserted: Halbduplex / half duplex<br>HD nicht eingelegt / not inserted: Vollduplex / full duplex |
| BD eingelegt / inserted: 75-, 100-Bd-Betrieb / 75-,100-Bd operation<br>BD nicht eingelegt / not inserted: 50-Bd-Betrieb / 50-Bd operation |
| MEI eingelegt / inserted: »Motor EIN« mit »Netz EIN« / "Motor ON" with "Power ON"<br>MEI nicht eingelegt / not inserted: Normalversion / normal version |
| BAW eingelegt / inserted: BAW-Zeit 2,1 s / BAW time 2.1 s<br>BAW nicht eingelegt / not inserted: BAW-Zeit 426 ms / BAW time 426 ms |
| LOP eingelegt / inserted: Lokal-Betrieb-Priorität aus / local operation priority off<br>LOP nicht eingelegt / not inserted: Lokal-Betrieb-Priorität ein / local operation priority on |
| LRS eingelegt / inserted:<br>obere Farbbandhälfte im Lokal-Betrieb / upper half of color ribbon by local operation<br>LRS nicht eingelegt / not inserted:<br>untere Farbbandhälfte im Lokal-Betrieb / lower half of color ribbon by local operation |

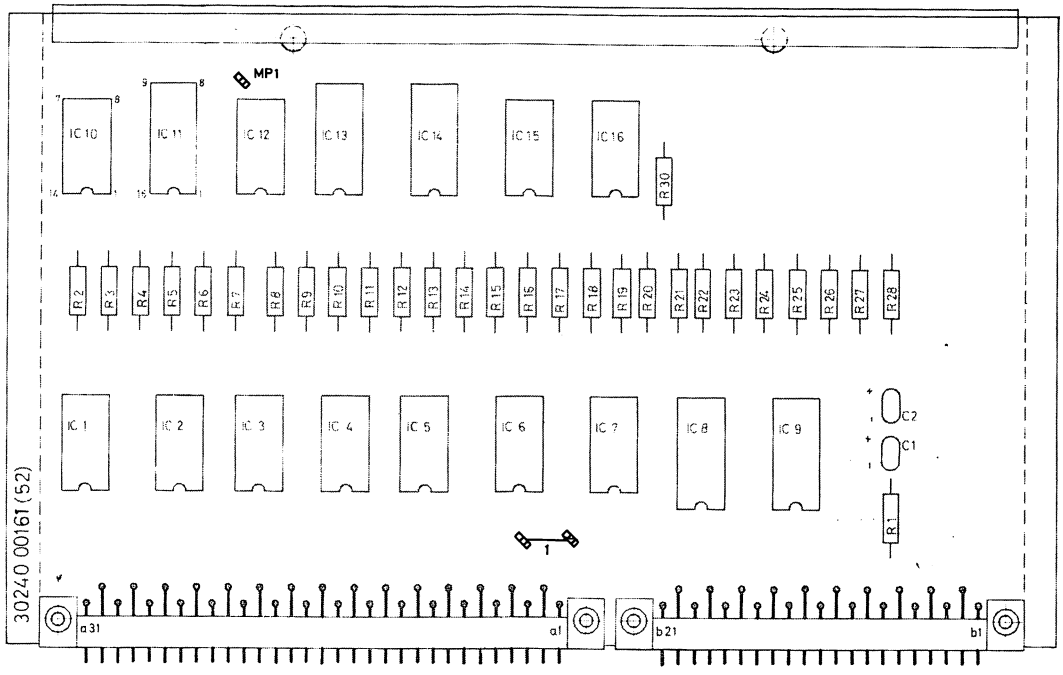
**LP6 V.28 U 57012 50168 A01**




Straps:

Strap 1 and 2 inserted: for MODEM connection *with* dataphone
Strap 1, 2, and 3 inserted: for MODEM connection with telephone *without* data key
Strap 1, 2, and 3 not inserted: for DATEX connection
Strap 4 inserted: half-duplex operation
Strap 4 not inserted: full-duplex operation

**LP 7 Subscriber Unit 2 57012 15170 A 01**



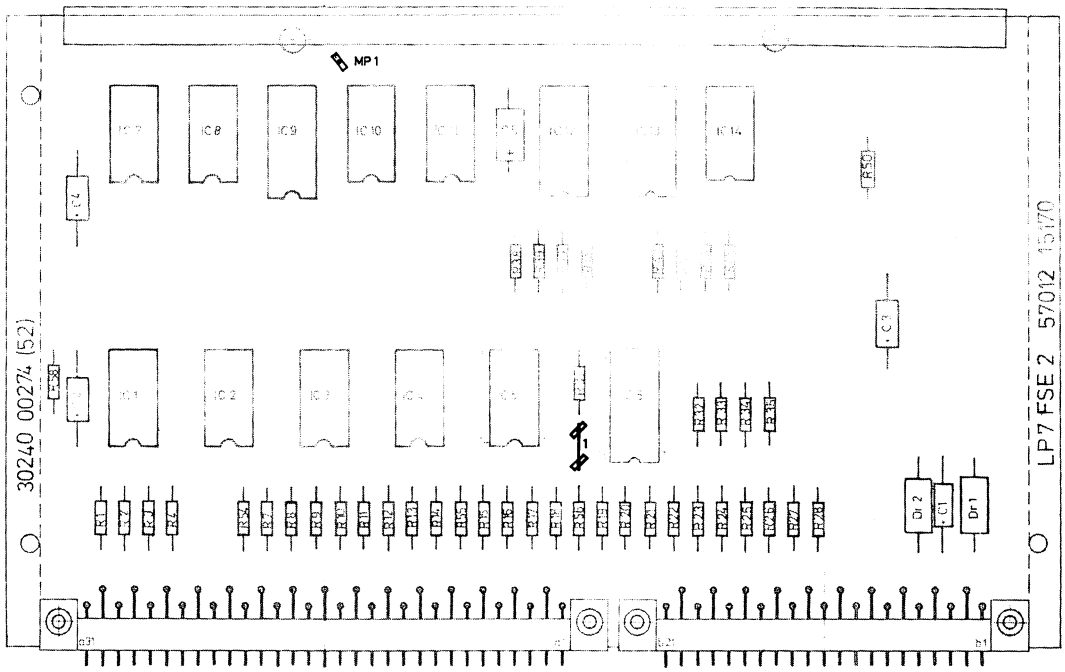

**Measuring Point:**

**MP 1: Select pulses (WI)**

**Straps:**

| Version (Order No.) | Mode of Operation | Strap 1 |
|---|---|---|
| 57012 15170 | Generation of select pulses during the select phase | × |
| | Suppression of generation of select pulses | |

**LP 7 Subscriber Unit 2 57012 15170 A 02**



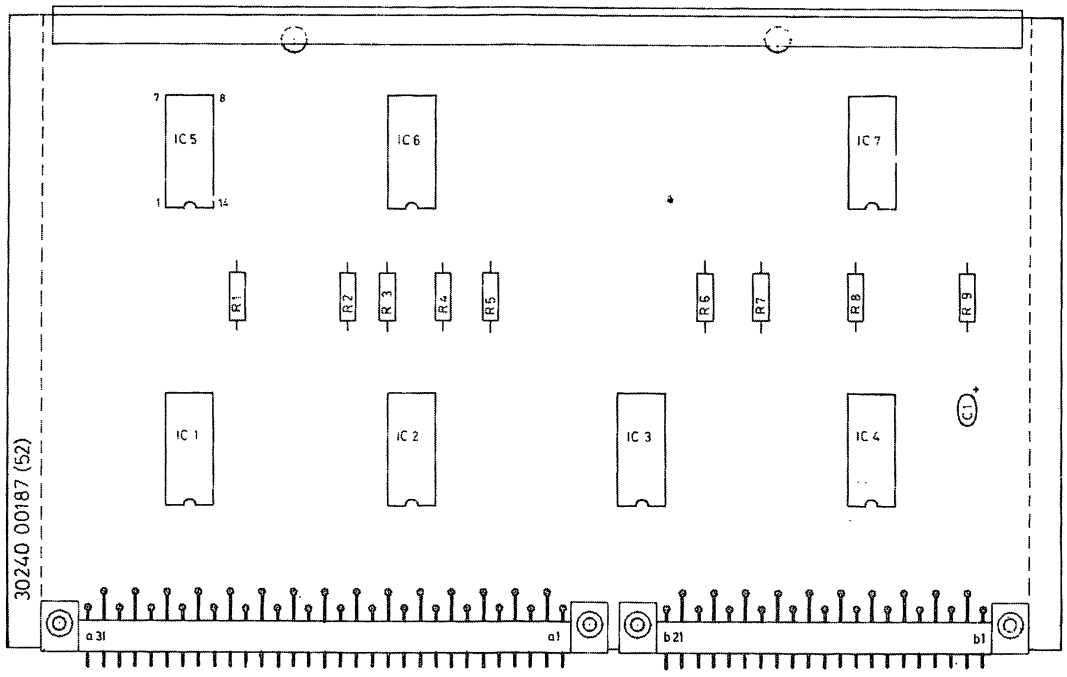

Measuring Point:

MP 1: Select pulses (WI)

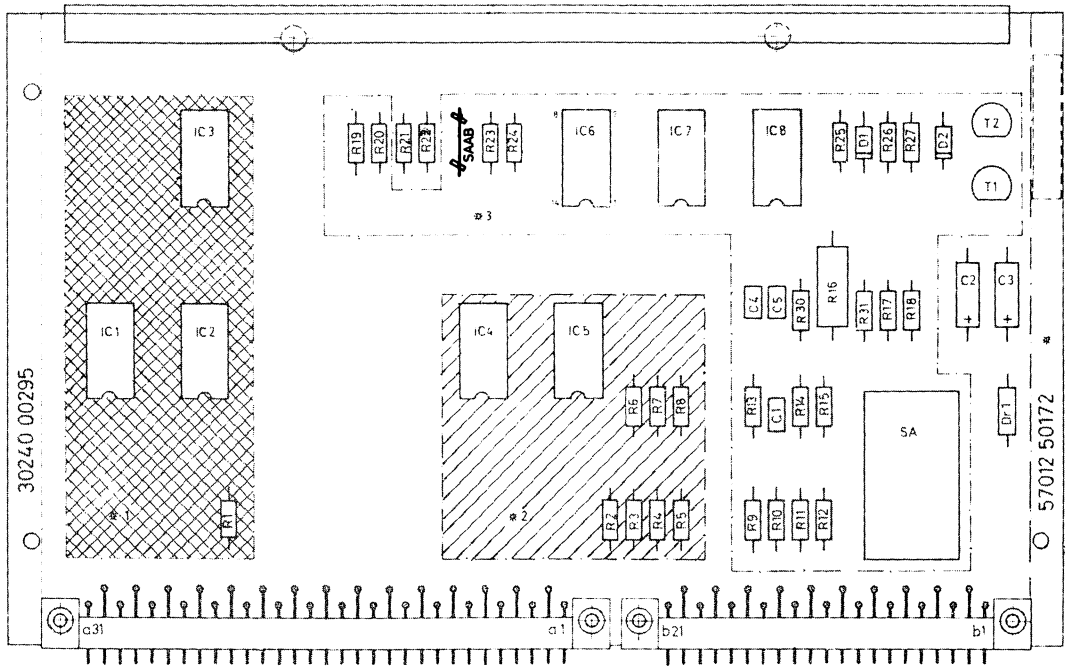
Straps:

| Version (Order No.) | Mode of Operation | Strap 1 |
|---|---|---|
| 57012 15170 | Generation of select pulses during the select phase | × |
| | Suppression of generation of select pulses | |

## LP 7 Subscriber Unit 2T 57012 15172 A01



**LP 7 Subscriber Unit 2 57012 50172 A 02**




57012 51172 *1 and *2 not equipped

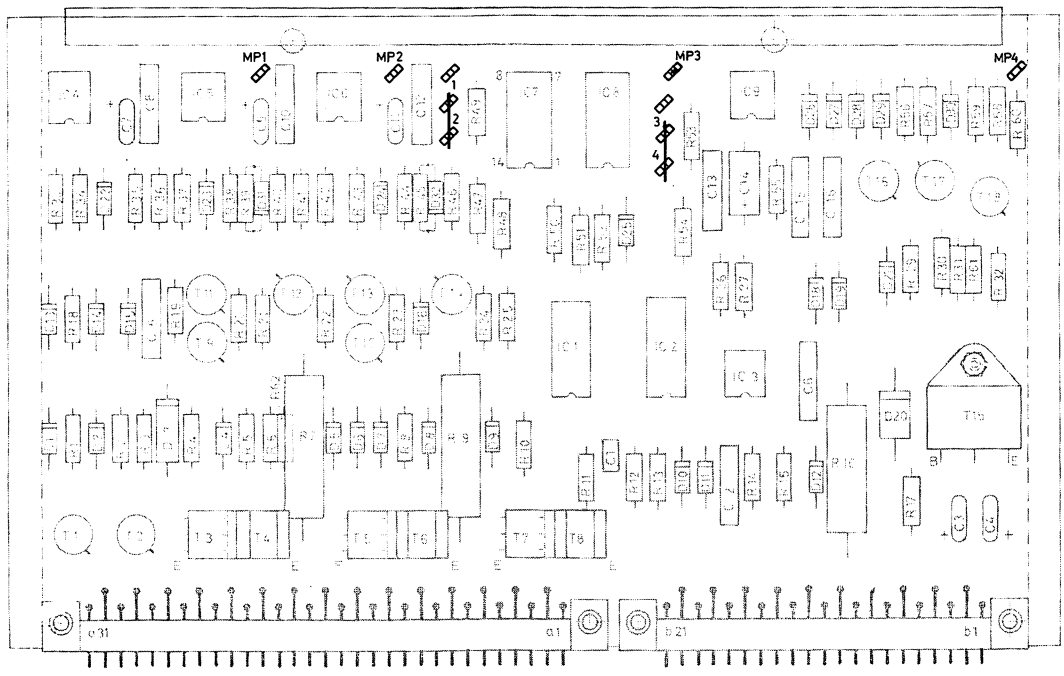
57012 15172 *3 not equipped

57012 50172 all equipped

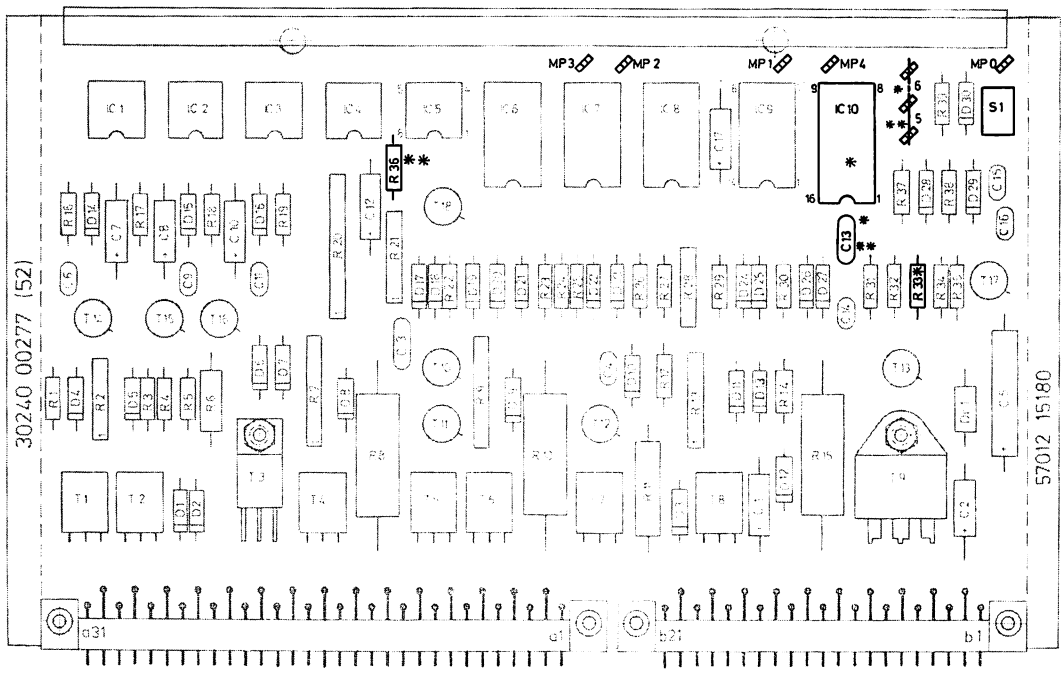
Strap SAAB inserted:
latched signal "incoming call" (ex. alarm) will be cleared by "incoming clearing" signal

Strap SAAB not inserted:
latched signal "incoming call" (ex. alarm) will **not** be cleared by "incoming clearing" signal

## LP 8 Final Stages 57012 15180 A 01



**LP 8 Final Stages 57012 15180 A 02 ****
**57012 15182 A 02 ***




Measuring Points:

MP 1: Basic setting signal ($\overline{GRS}$)
MP 2: Counting pulses digitalized ($\overline{ZIG1}$)
MP 3: Zero pulses digitalized ($\overline{NIG1}$)
MP 4: Stroboscope output for type bar adjustment ($\overline{AW}$)

* Only for 3-shift version (96 characters)
** Only for 2-shift version (64 characters)

Switch:

Switch for setting up the counting pulses for maintenance unit counter

| Mode of Operation[1]) | Switch Position | | | |
|---|---|---|---|---|
| | 50 (4) | 75 (3) | 100 (1) | Local (2) |
| Local 100 Bd, telegraph line 100 Bd | ×[2]) | ×[2]) | × | |
| Local 100 Bd, telegraph line 50 Bd | × | | | × |
| Local 100 Bd, telegraph line 75 Bd | | × | | × |

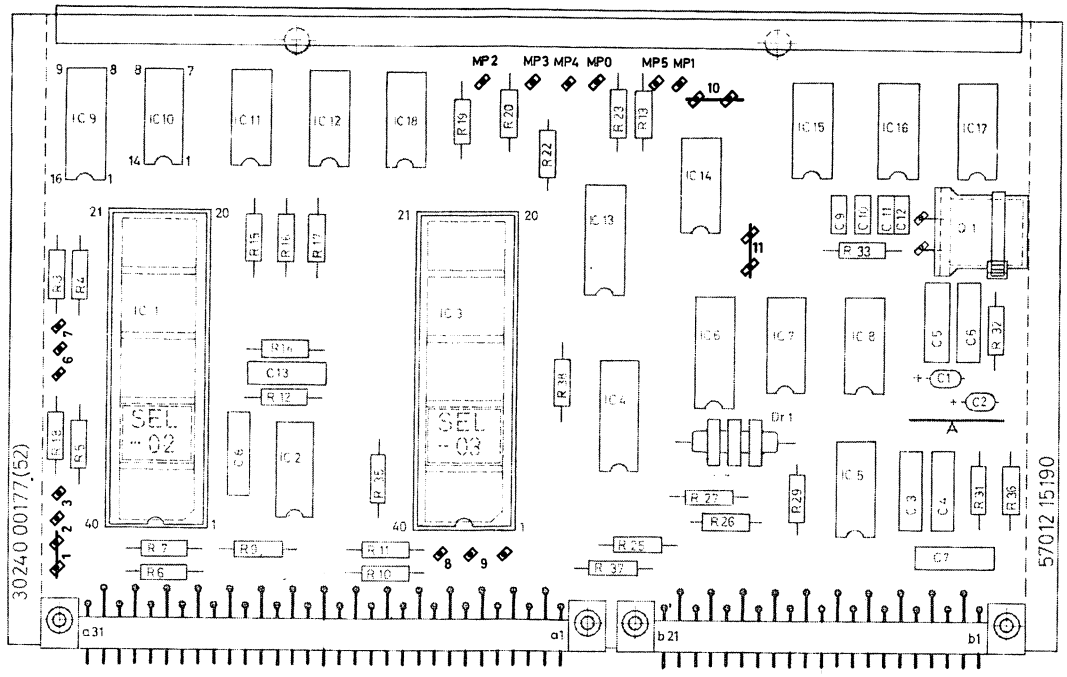
[1]) Observe the varied arrangements of straps for telegraph speed on PCB 9, Printing Unit Control
[2]) Both switch positions are possible because 100 Bd is dominant

Straps:

If the teleprinter is a 2-shift version, strap 5 must be inserted.
In the 3-shift version (96 characters), strap 6 must be inserted.
In addition, R36 is removed and C13(0.022 $\mu$F) is replaced by 6800 pF.
R33 and IC10 are added.

| Order No. | Version | Straps | | R33 | R36 | C13 | IC10 |
|---|---|---|---|---|---|---|---|
| | | 5 | 6 | | | | |
| 57012 15180 | 2 shift (64 characters) | × | | — | × | 0.022 $\mu$F | |
| 57012 15182 | 3 shift (96 characters) | | × | × | — | 6800 pF | × |

## LP 9 Printing Unit Control 57012 15190 A 01




Measuring Points:

MP 0: 0 V
MP 1: Signal "Character available" (ZV)
MP 2: Signal BUSY 3
MP 3: Signal "Selection pulse" ($\overline{AW}$)
MP 4: 307.2-kHz-clock pulse
MP 5: Signal "Select magnet" ($\overline{AWM}$)

Straps:

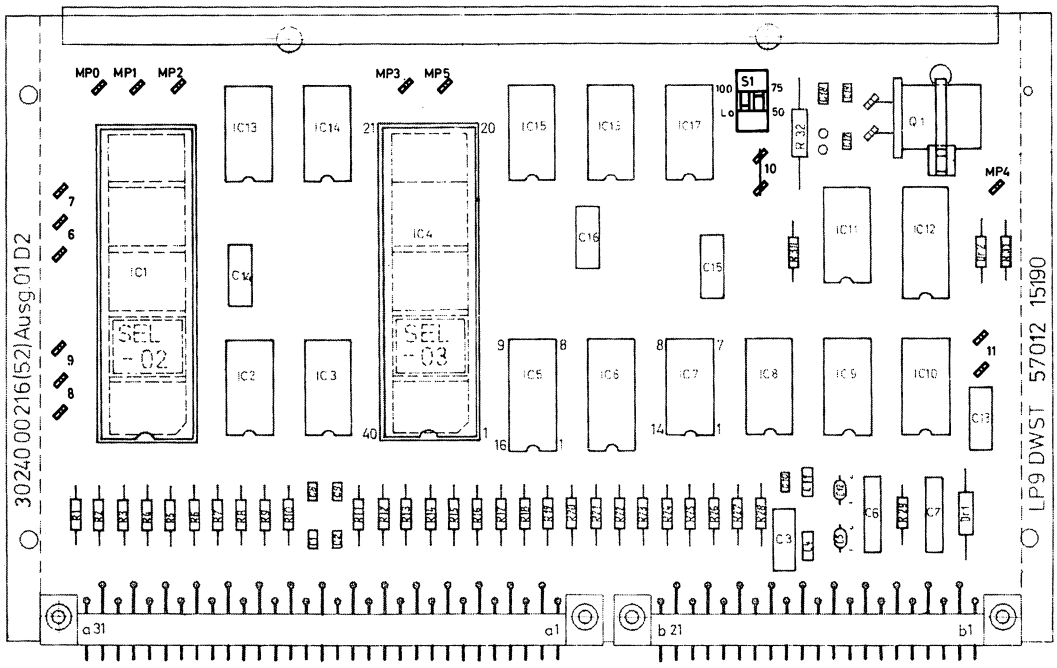
| Version (Order No.) | Mode of Operation[1] (Telegraph Speed in Bauds) | Straps | | | | | Straps | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 10 | 11 | 6 | 7 | 8 | 9 | |
| 57012 15190 | Local 100 Bd, telegraph line 50 Bd | × | | | × | × | × | | | | 3rd shift by 4 times S sequence |
| 57012 15196[2] | Local 100 Bd, telegraph line 50 Bd | × | | | × | × | | × | | | 3rd shift by 32nd combination |
| 57012 51190 | Local 100 Bd, telegraph line 75 Bd | × | | × | × | × | | | × | | Automatic line feed when carriage return |
| 57012 52190 | Local 100 Bd, telegraph line 100 Bd | | × | | × | × | | | | × | Automatic carriage return when line feed |
| 57012 52196[2] | Local 100 Bd, telegraph line 100 Bd | | × | | × | × | | | | | |

interruption straps for measuring clock T and G 192

[1] When changing the telegraph speed observe the varied arrangements of straps on PCB 8, Final Stages

[2] That means 104 characters/line; clock T1 = T2

## LP 9 Printing Unit Control 57012 15190 A 02




Measuring Points:

MP 0: 0 V
MP 1: Signal "Character available"
MP 2: Signal BUSY 3
MP 3: Signal "Selection pulse" ($\overline{AW}$)
MP 4: 307.2-kHz-clock pulse
MP 5: Signal "Select magnet" ($\overline{AWM}$)

Straps:

| Version Order No. | Straps | | | | | |
|---|---|---|---|---|---|---|
| | 6 | 7 | 8 | 9 | 10 | 11 |
| 57012 15190 | | | | | × | |
| 57012 50190 | | | | | × | × |

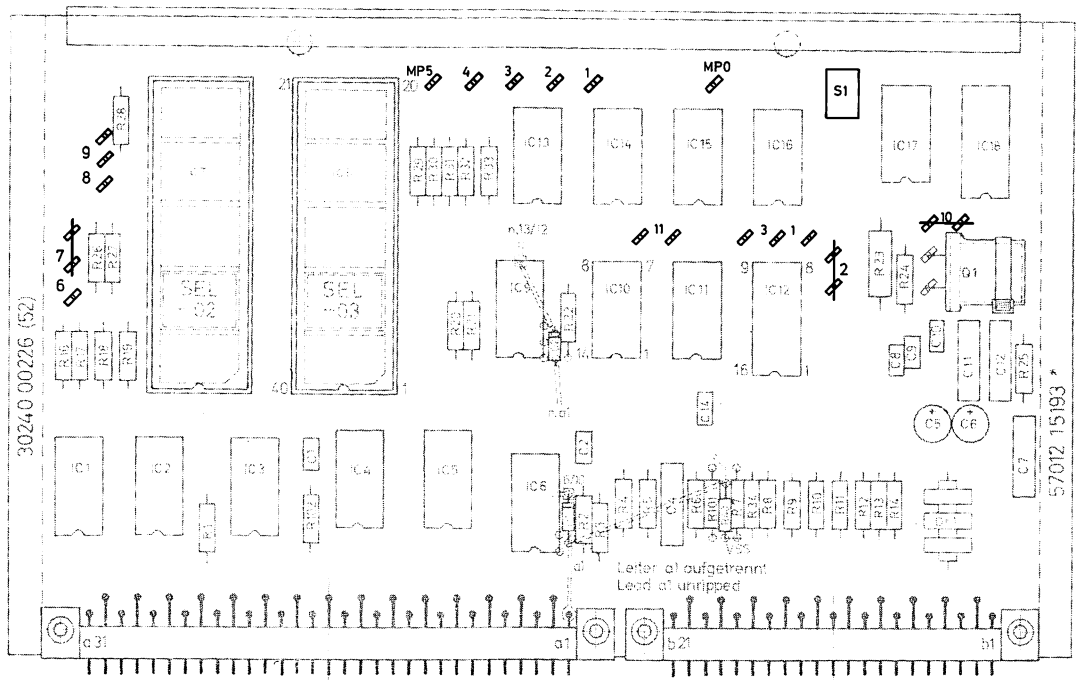
Switch 1:

| Mode of Operation[1]) (Telegraph Speed in Bauds) | Switch Position | | | |
|---|---|---|---|---|
| | 1/I | | 1/II | |
| | Local | 100 | 50 | 75 |
| Local 100 Bd, telegraph line 50 Bd | × | | × | |
| Local 100 Bd, telegraph line 75 Bd | × | | | × |
| Local 100 Bd, telegraph line 100 Bd | | × | random position | |

[1]) When changing the telegraph speed observe the varied arrangements of straps on PCB 8, Final Stages

| Strap | Function |
|---|---|
| 6 | inserted: changing to the 3rd shift by 4 times S |
| 7 | inserted: changing to the 3rd shift by 32nd combination |
| 8 | inserted: automatic LF with CR |
| 9 | inserted: automatic CR with LF |
| 10 | always inserted |
| 11 | inserted: automatic CR and LF from the end of line switch |

## LP 9 Printing Unit Control 96 Characters 57012 15193 A 01




Measuring Points:

MP 0: 0 V
MP 1: Signal "Character available" (ZV)
MP 2: Signal BUSY 3
MP 3: Signal "Selection pulse" ($\overline{AW}$)
MP 4: 307.2-kHz-clock pulse (T)
MP 5: Signal "Select magnet" ($\overline{AWM}$)

Straps and Switch:

| Version / Order No. | Straps 1 | 2 | 3 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|
| 57012 15193 | | × | | | × | | | × | |
| 57012 50193 | | × | | | × | | | × | × |
| 57012 51193 | × | | | | | | | × | × |

Switch S1:

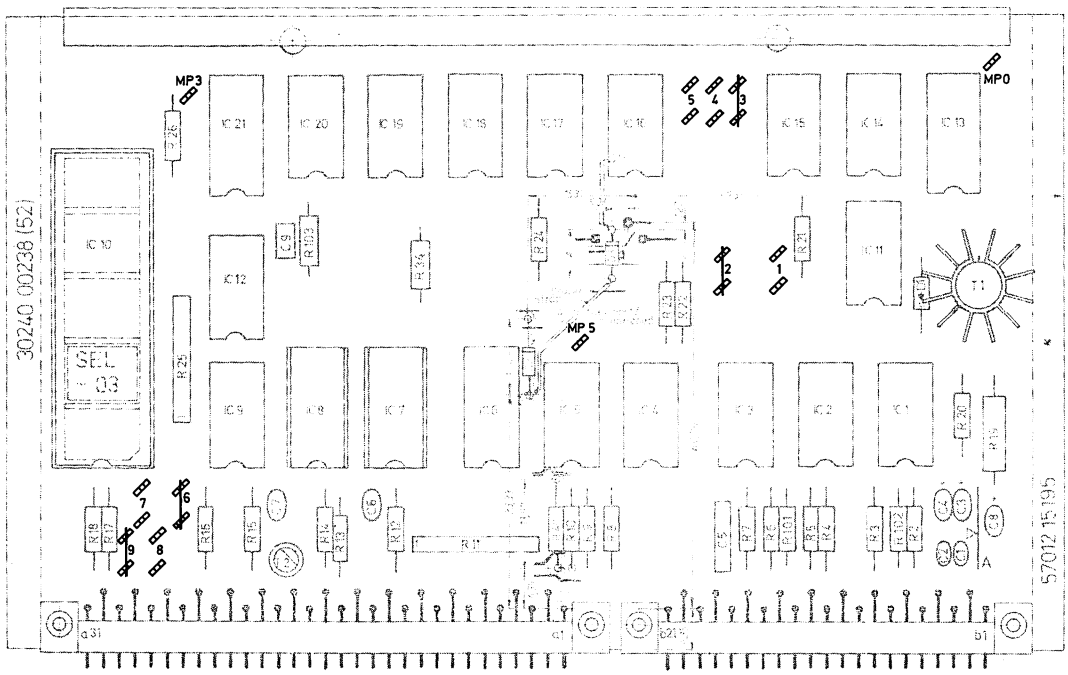
Slide switch S1 serves for telegraph speed adjustment. The teleprinter can be set to the following telegraph speeds:

| Telegraph Speed[1]) in Bauds | |
|---|---|
| Local Operation | Telegraph Operation |
| 100 | 50 |
| 100 | 75 |
| 100 | 100 |

[1]) When changing the telegraph speed observe the varied arrangements of straps on PCB 8, Final Stages

| Strap | Function (strap inserted) |
|---|---|
| 1 | 64 characters (2-shift) |
| 2 | 96 characters (3-shift) |
| 3 | 128 characters (4-shift) |
| 6 | changing to the 3rd shift by 4 times S |
| 7 | changing to the 3rd shift by 32nd combination |
| 8 | automatic LF with CR |
| 9 | automatic CR with LF |
| 10 | always inserted |
| 11 | automatic CR and LF from the end-of-line switch |

## LP 9 Printing Unit Control 1-F Code 57012 15195 A01




Measuring Points:

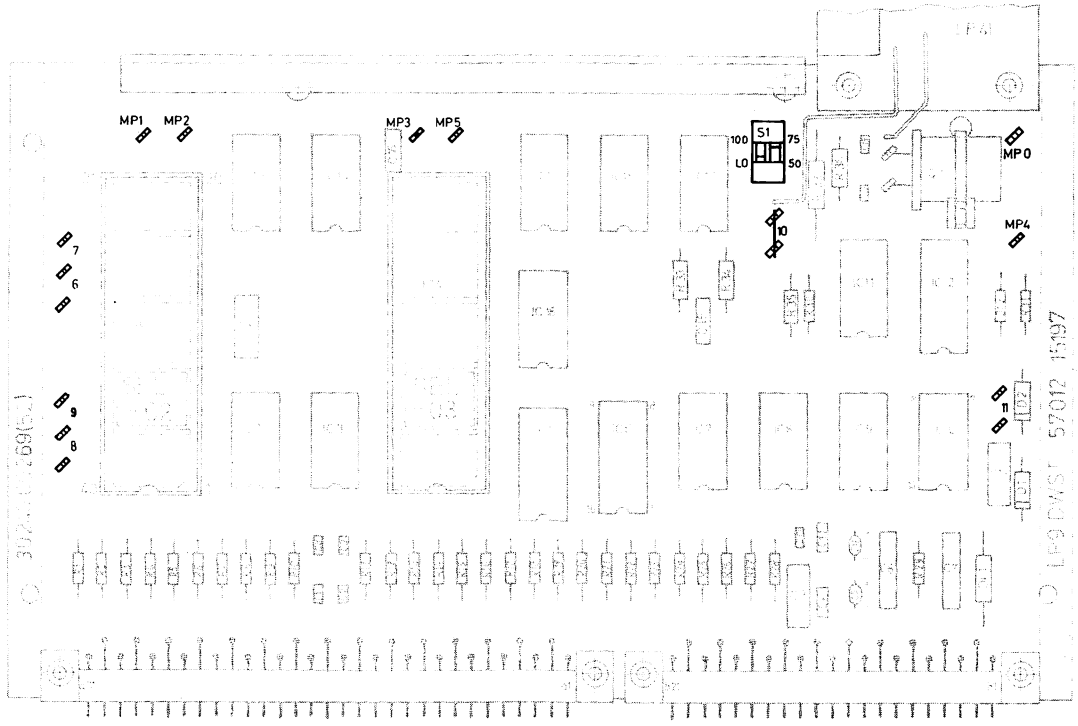
MP0: 0 V
MP3: Signal "Selection pulse" ($\overline{AW}$)
MP5: Signal "Select magnet" ($\overline{AWM}$)

Straps:

| Version Order No. | Straps | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 57012 15195 | | × | × | | | × | | | × |
| 57012 50195 | × | × | × | | | × | | | × |

| Strap inserted | Function |
|---|---|
| 1 | automatic CR and LF from the end-of-line switch |
| 2 | no printing unit feed, programmed |
| 3 | 2-shift |
| 4 | 3-shift |
| 5 | 4-shift |
| 6 | 7-bit code |
| 7 | 5-bit code |
| 8 | automatic CR with LF |
| 9 | automatic LF with CR |

## LP 9 Printing Unit Control 57012 15197 A 02




Measuring Points:

MP 0: 0 V
MP 1: Signal "Character available" (ZV)
MP 2: Signal BUSY 3
MP 3: Signal "Selection pulse" ($\overline{AW}$)
MP 4: 307.2-kHz-clock pulse (T)
MP 5: Signal "Select magnet" ($\overline{AWM}$)

Straps and Switch:

| Strap inserted | Function |
|---|---|
| 6 | changing to 3rd shift by 4 times S |
| 7 | changing to 3rd shift by 32nd combination |
| 8 | automatic LF with CR |
| 9 | automatic CR with LF |
| 10 | always inserted |
| 11 | automatic CR and LF from the end-of-line switch |

Switch S1:

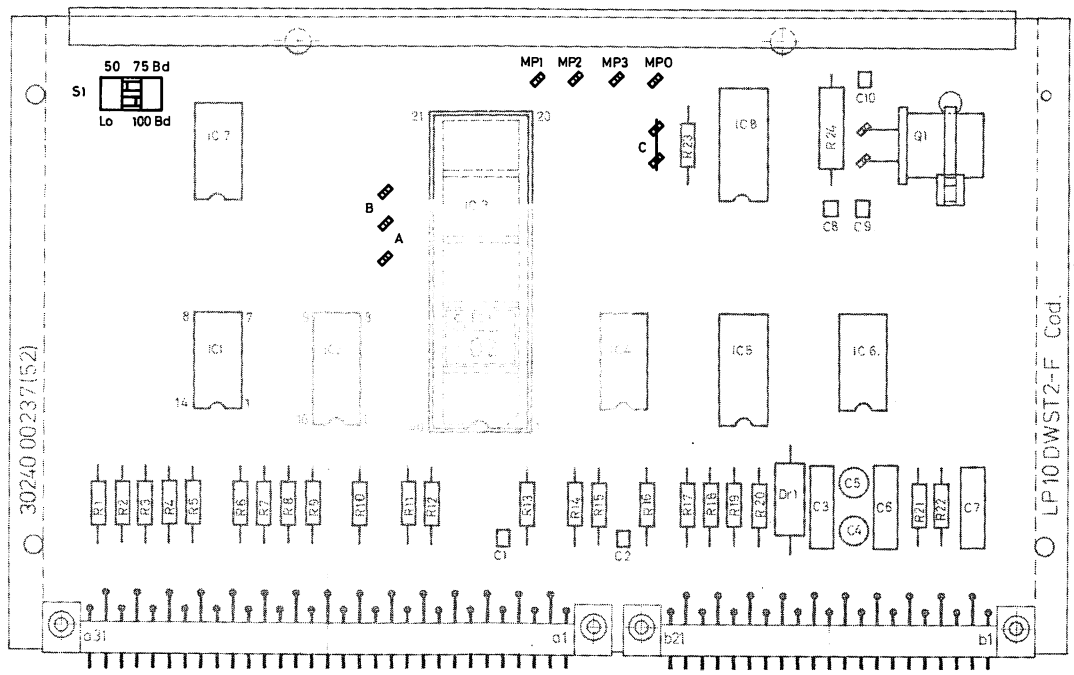
Switch S1 is used for setting up the telegraph speeds indicated below.

| Switch Position | | | | Telegraph Speed in Bauds | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | Local Operation | Telegraph Operation |
| × | | × | | 100 | 50 |
| × | | | × | 100 | 75 |
| | × | — | — | 100 | 100 |

Switch LP 41:

Switch LP 41 is used for switching off the printing unit. Any incoming data can still however be punched.

## LP 10 Printing Unit Control 2-F Code 57012 15202 A 01




Measuring Points:

MP 0: 0 V
MP 1: Signal BUSY 3
MP 2: Signal "Character available" (ZV)
MP 3: 307.2-kHz-clock pulse (T)

Straps and Switch:

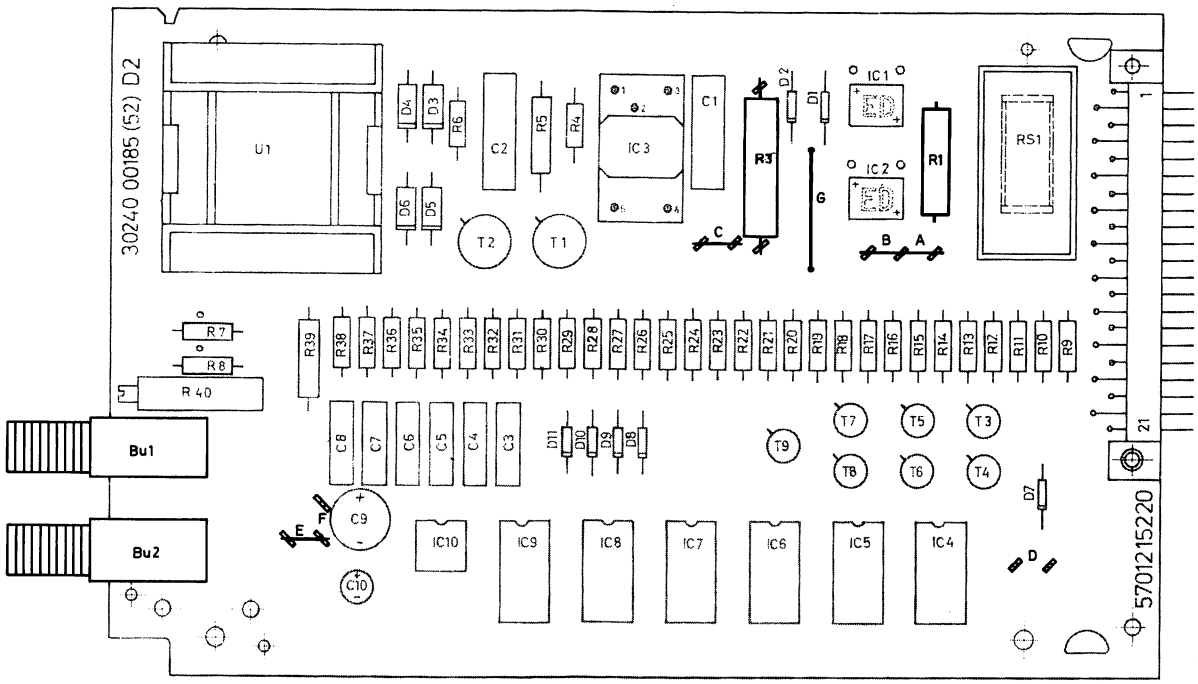
| Strap inserted | Function |
|---|---|
| A | changing to 3rd shift by 4 times S |
| B | changing to 3rd shift by 32nd combination |
| C | always inserted |

Switch S1

Switch S1 is used for setting up the telegraph speeds indicated below.

| Switch Position | | | | Telegraph Speed in Bauds | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | Local Operation | Telegraph Operation |
| × | | × | | 100 | 50 |
| × | | | × | 100 | 75 |
| | × | — | — | 100 | 100 |

## LP 12 Line Adaptation 57012 15221 A 01




Bu 1: Interruption female connectors for measuring the transmit data D 1
Bu 2: Interruption female connectors for measuring the receive data D 2

Straps:

| Version (Order No.) | | Straps | | | | | | | R3 | R1 |
|---|---|---|---|---|---|---|---|---|---|---|
| LP 12 with casing | LP 12 w/o casing | A | B | C | D | E | F | G | | |
| 57012 15221 | 57012 15220 | × | × | × | | × | | always inserted | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 15329 | 57012 15220 | × | × | | | × | | | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 50321 | 57012 15220 | × | × | × | | | × | | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 50323 | 57012 15220 | × | × | × | × | × | | | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 50327 | 57012 15220 | × | × | × | × | | × | | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 15323 | 57012 15228 | × | × | × | × | × | | | 20 kohms/1 W | 62 ohms/0.33 W |
| 57012 15328 | 57012 15228 | × | × | | | × | | | 20 kohms/1 W | 62 ohms/0.33 W |
| 57012 50328 | 57012 15228 | × | × | × | × | × | | | 20 kohms/1 W | 33 ohms/0.33 W |

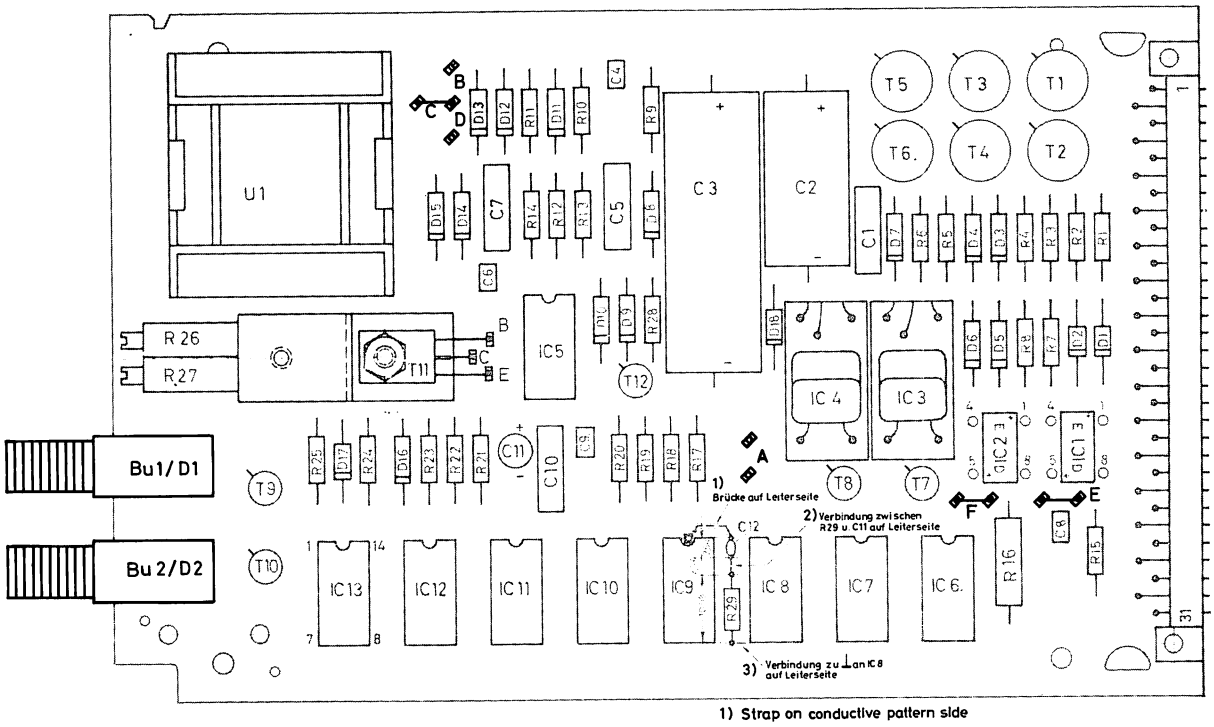
| Strap | Mode of Operation |
|---|---|
| A, B | inserted: if IC 1 and IC 2 ≙ H 15 B 1 (or SOC 307); not inserted: if IC 1 and IC 2 ≙ 5082-4370 |
| C | inserted: static current ≠ 0; not inserted: static current = 0 |
| D | inserted: line monitoring on; not inserted: line monitoring off |
| E | inserted: D 2 on line polarity dependent; not inserted: than strap F |
| F | inserted: D 2 on line polarity independent; not inserted: than strap E |

| Values of Resistors | | Order No. | Function |
|---|---|---|---|
| R1 | 33/0.33 W | 41132 42330 | operating current 60 mA |
| | 62/0.33 W | 41132 42620 | operating current 40 mA |
| R3 | 20 k/1 W | 41145 25200 | static current 5 mA |
| | 56 k/0.5 W | 41145 25560 | static current 2 mA |

DC 4W



**LP 12 Line Adaptation 57012 15325 A01**




1) Strap on conductive pattern side
2) Connection between R 29 and C11 on conductive pattern side
3) Connection to ⊥ at IC 8 on conductive pattern side

Bu 1: Interruption female connectors for measuring the transmit data D1
Bu 2: Interruption female connectors for measuring the receive data D2

Straps:

| Version (Order No.) | | Straps | | | | | |
|---|---|---|---|---|---|---|---|
| LP12 with housing | LP12 w/o housing | A | B | C | D | E | F |
| 57012 15325[1]) | 57012 15225 | | | × | | × | × |
| 57012 15327 | 57012 15225 | | | | × | × | × |
| 57012 50320[2]) | 57012 15225 | | | × | | × | × |

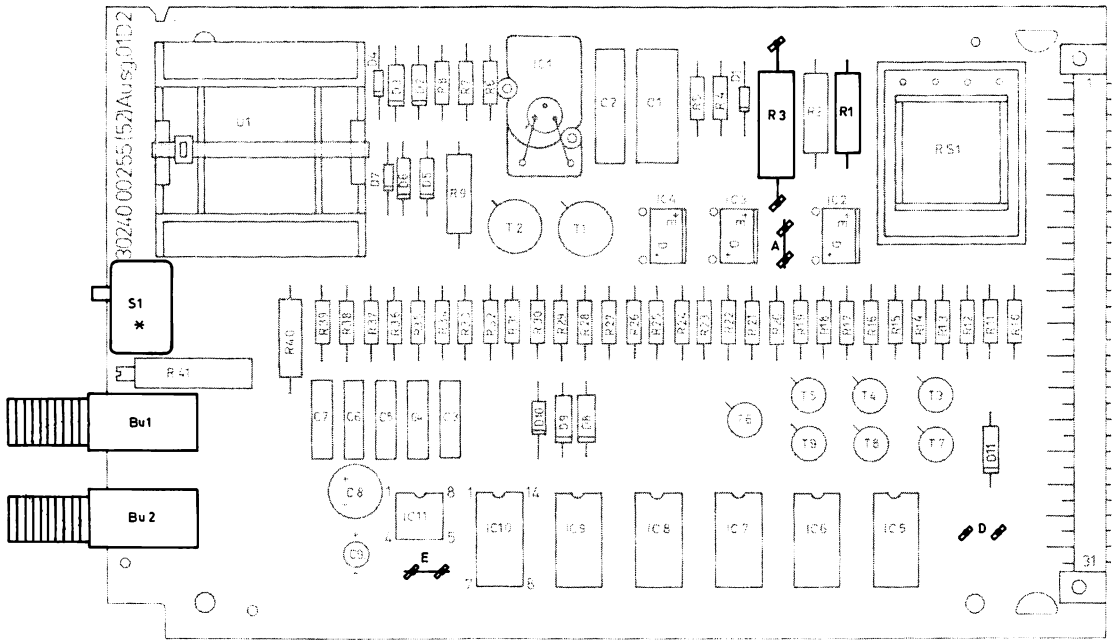
[1]) Adjusting of voltage at R26 and R27 upon 60 V
[2]) Adjusting of voltage at R26 and R27 upon 48 V

| Strap | Mode of Operation |
|---|---|
| A | inserted: Line monitoring ON<br>not inserted: Line monitoring OFF |
| B | inserted: Open-circuit voltage < 30 V |
| C | inserted: Open-circuit voltage 48 and 60 V |
| D | inserted: Open-circuit voltage 80 V |
| E, F | inserted: if IC1 = IC2 ≙ H15 B1 (SOC 307)<br>not inserted: if IC1 = IC2 ≙ 5082-4370 |

SC 4W



## LP 12 Line Adaptation 57012 15326 A 02




* S1 Nur in Ausführung 57012 50226 bestückt
Only in version 57012 50226 equipped

Bu 1: Interruption female connectors for measuring the transmit data D1
Bu 2: Interruption female connectors for measuring the receive data D2

**Straps:**

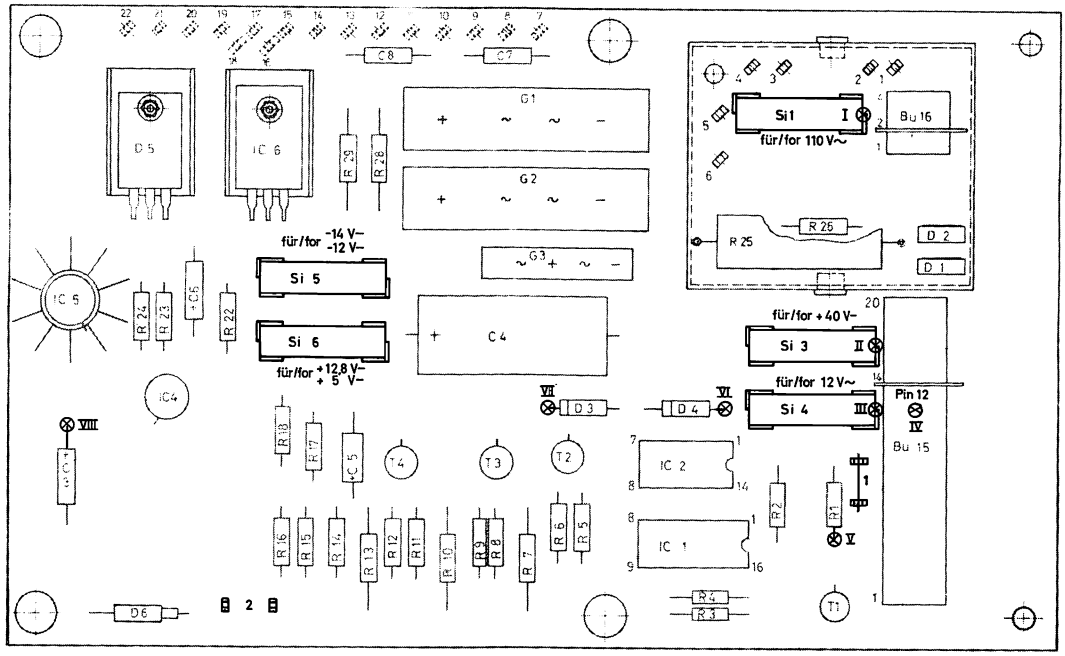
| Version Order No. | Straps | | | Switch S1 equipped[1] |
|---|---|---|---|---|
| | A | D | E | |
| 57012 15326 | × | | × | |
| 57012 50326 | × | | × | × |
| 57012 51323 | × | × | × | |
| 57012 51326 | × | | | |
| 57012 51327 | × | × | | |

[1]) Switch S1 (Order No. 48312 21023) is used for switching from high-level to low-level usings

| Strap | Function | |
|---|---|---|
| | Strap inserted | Strap not inserted |
| A | Static current ≠ 0 | Static current = 0 |
| D | Line monitoring ON | Line monitoring OFF |
| E | D2 dependent on line polarity | D2 independent of line polarity |

N/A

## LP 15 Power Supply Unit 57012 15250 A 01



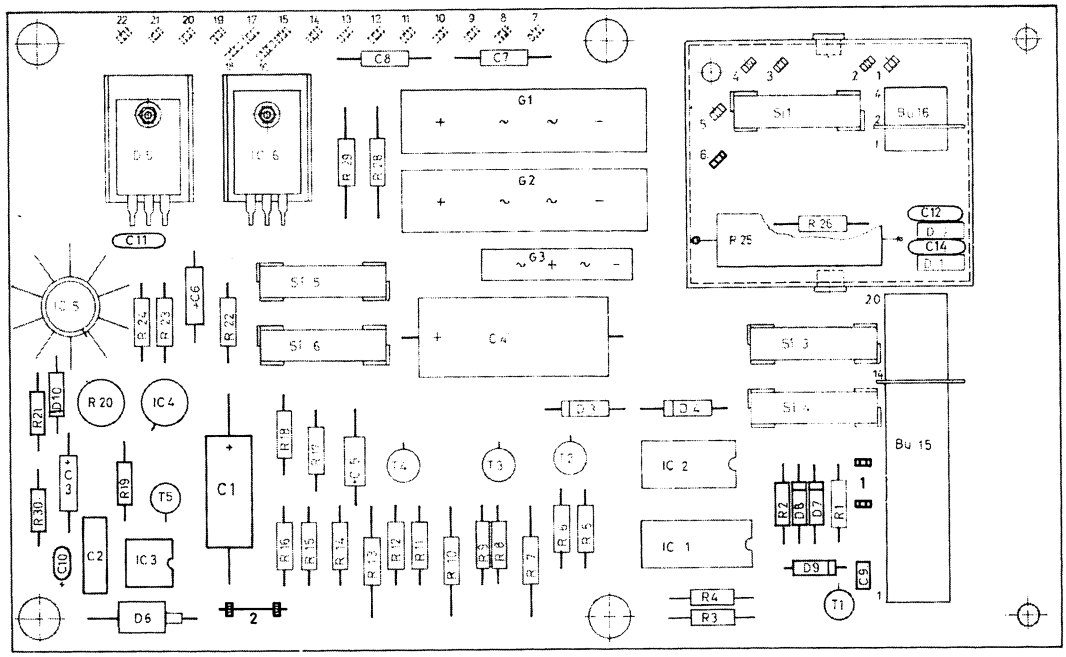

Measurements:

| Measuring Point | | Voltage |
|---|---|---|
| I | Si 1 | 110 V ~ |
| II | Si 3 | + 40 V — |
| III | Si 4 | 12 V ~ |
| IV | Bu 15/12 | + 5 V — |
| V | R 1 | 0 V |
| VI | D 4 | —12 V — |
| VII | D 3 | —14 V — |
| VIII | C 3 | + 12.8 V — |

Straps:

The PCB 15, Power Supply Unit, 57012 15250 is built up without motor switch. For this reason strap 1 must be inserted.

## LP 15 Power Supply Unit 57012 15253 A01

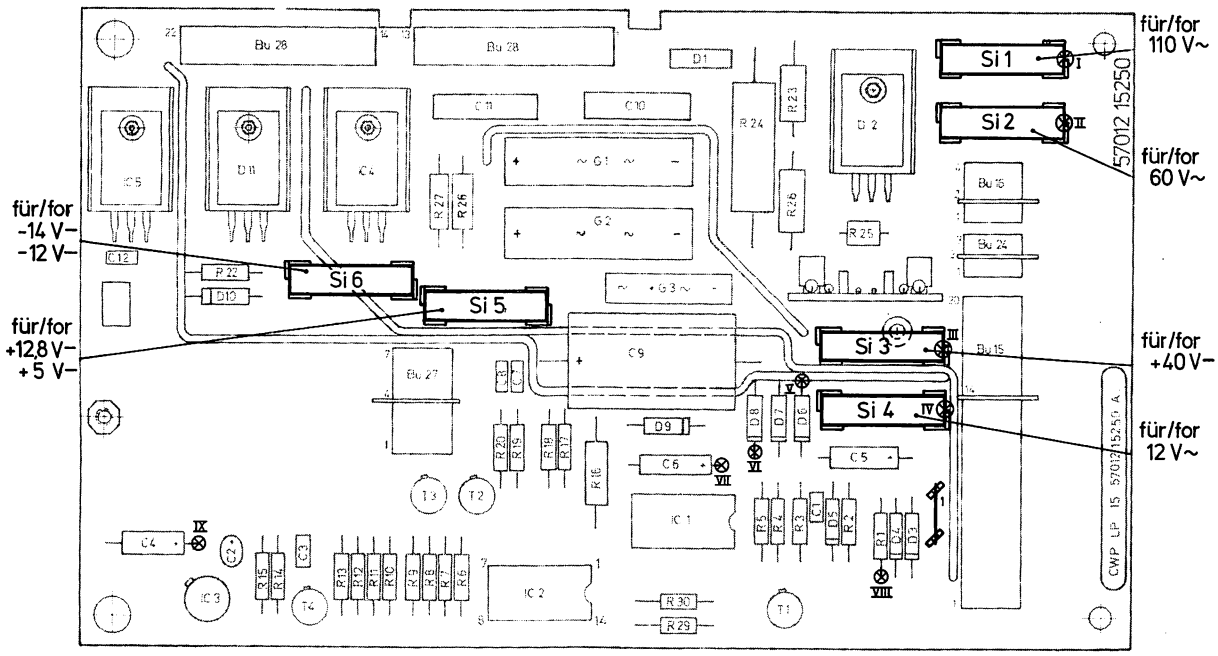



Measurements:
the same as for Power Supply Unit 57012 15250

Straps:

| Version (Order No.) | Mode of Operation | Straps | |
|---|---|---|---|
| | | 1 | 2 |
| 57012 15253 | Motor switch active | | × |
| 57012 50253 | Motor switch not active | × | |

## LP 15 Power Supply Unit 57012 51250 A 02



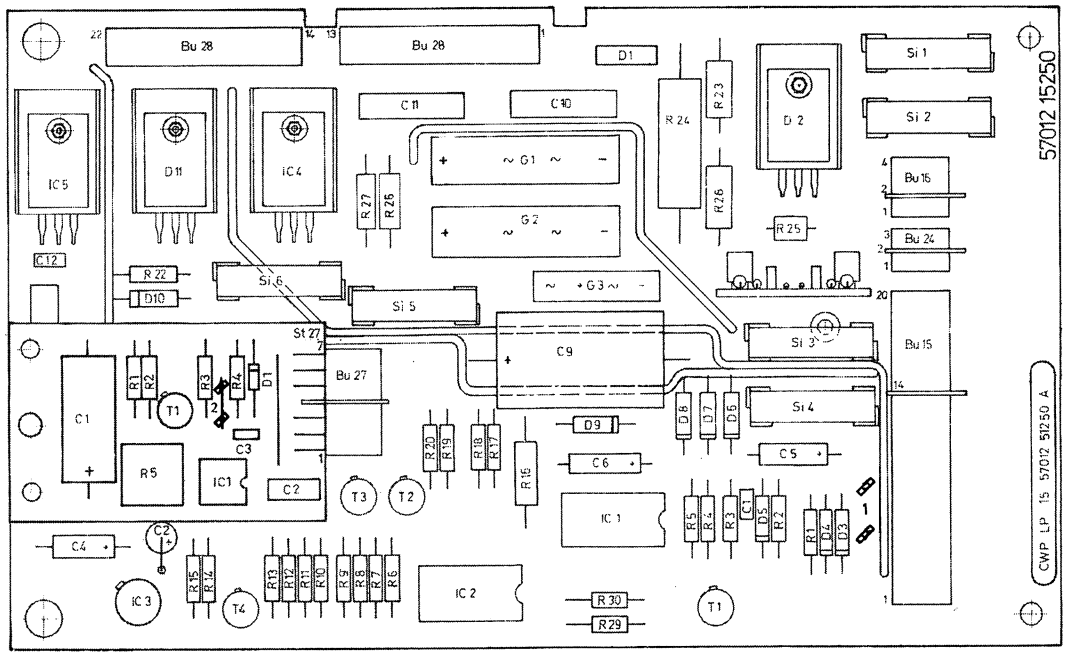

Measurements:

| Measuring Point | | Voltage |
|---|---|---|
| I | Si 1 | 110 V ~ |
| II | Si 2 | 60 V ~ |
| III | Si 3 | + 40 V — |
| IV | Si 4 | 12 V ~ |
| V | D6 | —12 V — |
| VI | D8 | —14 V — |
| VII | C6 | + 5 V — |
| VIII | R1 | 0 V |
| IX | C4 | + 12.8 V — |

Straps:

The PCB 15, Power Supply Unit, 57012 51250 is built up without motor switch. For this reason strap 1 must be inserted.

## LP 15 Power Supply Unit 57012 51253 A 02




Measurements:
the same as for Power Supply Unit 57012 51250

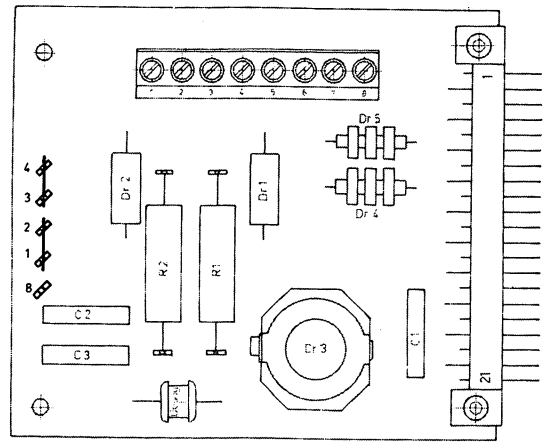
Straps:

The motor switch is built up upon a separate printed circuit board (LP 22 57012 15320). It is plugged-in in socket Bu 27 on Power Supply version 57012 51253.

| Version (Order No.) | Mode of Operation | Straps[1]) | | Built-up of |
|---|---|---|---|---|
| | | 1 | 2 | |
| 57012 51253 | Motor switch active | | × | 57012 51250 + 57012 15320 |
| 57012 52253 | Motor switch not active | × | | 57012 51250 + 57012 15320 |
| 57012 53253 | Motor switch not active on local operation | × | × | 57012 51250 + 57012 15320 |

[1]) Strap 1 is inserted on PCB 15 (LP 15)
Strap 2 is inserted on PCB 22 (LP 22)

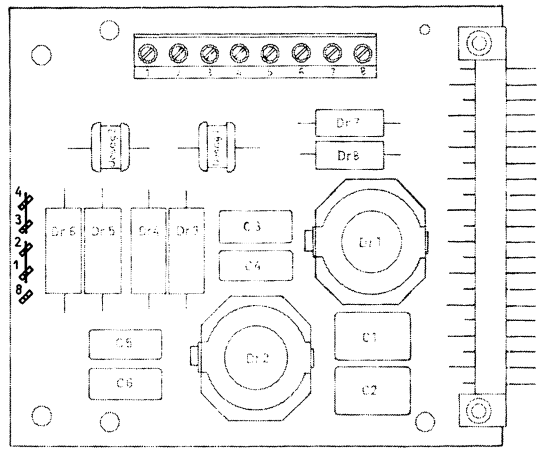
**LP 16 Filter 57012 15260 A 01**
(included in Filter, compl. 57012 16001...5, 7)




Straps:

The data lines D1 (soldering terminals 1-2) and D2 (soldering terminals 3-4) on PCB 15 Filter may become unripped.
It is possible to lead D1 and D2 outwards via an additional telegraph socket which may become mounted on the filter, compl. (external special features with V. 28 level).

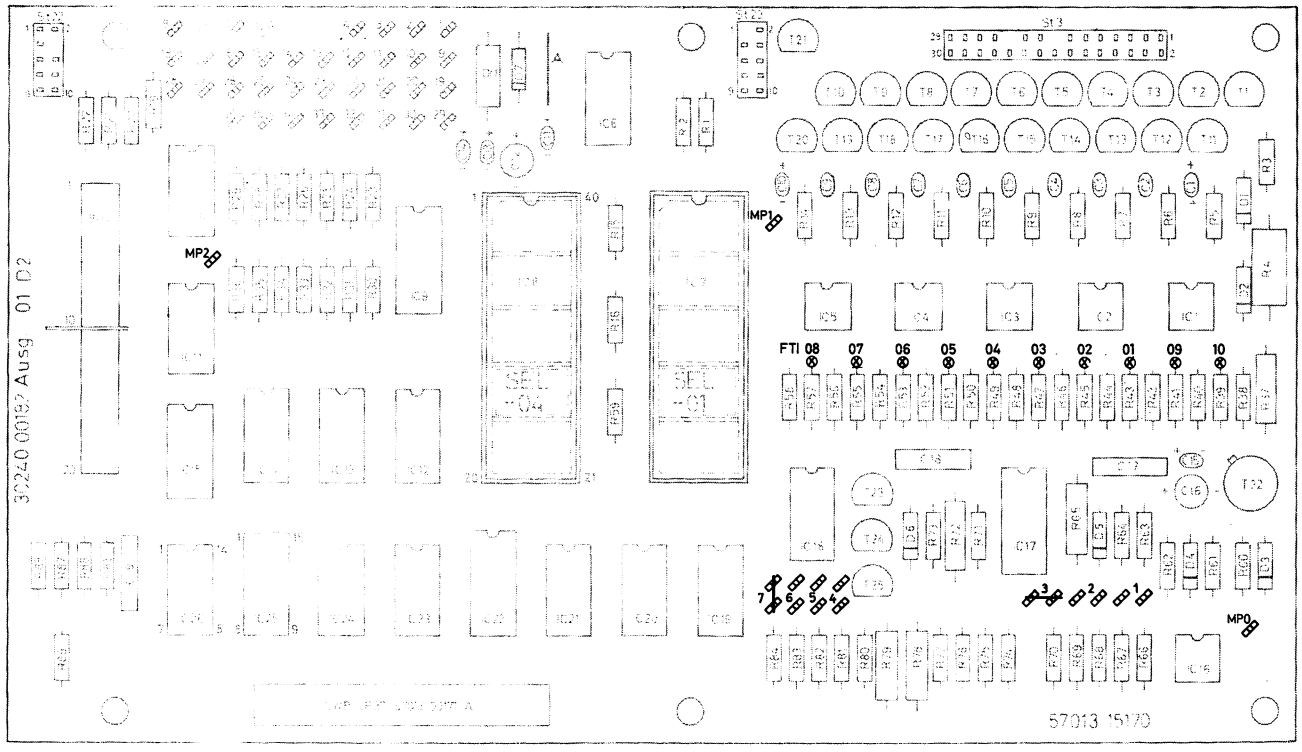
**LP 16 Filter 4 DR E/D**
(included in Filter, compl.
57012 15264 A 01,
57012 16010 and 57012 16012)




Straps:

The data lines D1 (soldering terminals 1-2) and D2 (soldering terminals 3-4) on PCB 15 Filter may become unripped.
It is possible to lead D1 and D2 outwards via an additional telegraph socket which may become mounted on the filter, compl. (external special features with V. 28 level).

**LP 37 Transmitter Control 57013 15171 A 01**
**(with Cable)**




Measuring Points:

MP 0: 0 V
MP 1: Pulse STAE
(start recognition ≙ recognition of a key operation)
MP 2: Start pulse for tape reader ($\overline{STA}$)

The voltage drop over the respective collector resistance of the amplifier stage which is competent for the respective light channel in the keyboard, may be measured on the points FTI 01 to 10. In local operation there must be measurable a voltage drop of $\geq$ 300 mV between the points ⊗ → MP 0 (meter 50 kohms/V).

Straps:

| Version (Order No.) | Straps | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 57013 15170 | | | × | | | | × |
| 57013 15172 | | | × | | × | | × |
| 57013 15178[1] | | | × | | | | × |
| 57013 51170[2] | | | × | | | × | |

[1] Soldering terminals 8 connected with 12 and 14 with 28.
[2] Lead from soldering terminal 17 unsoldered and isolated.

LP37 Transmitter Control 57013 15171 A01
(with Cable)

Mode of operation:

| Straps | | | Answer-back Units 1 and 2 | |
|---|---|---|---|---|
| 1 | 2 | 3 | Internal Release | External Release |
| | | | 1 | |
| | × | | 1 and 2 | |
| | | × | 1 | 1 |
| × | | × | 1 | 1 and 2 |
| × | × | × | 1 and 2 | 1 and 2 |

Strap 3 inserted: $\overline{WD}$ = "0"
Answer-back unit release at reception of "WHO ARE YOU" combination

Strap 2 inserted: TAKG = "1"
Answer-back unit 2 is released subsequently to answer-back unit 1 when answer-back unit 1 key is depressed

Strap 1 and 3 inserted: $\overline{WD}$ = "0"
Answer-back unit 2 is automatically released subsequently to answer-back unit 1

Strap 4 not inserted:
$\overline{SSL2}$ = 12 V ≙ 1.5 element stop signal

Strap 4 inserted:
$\overline{SSL2}$ = 0 V ≙ 2 element stop signal

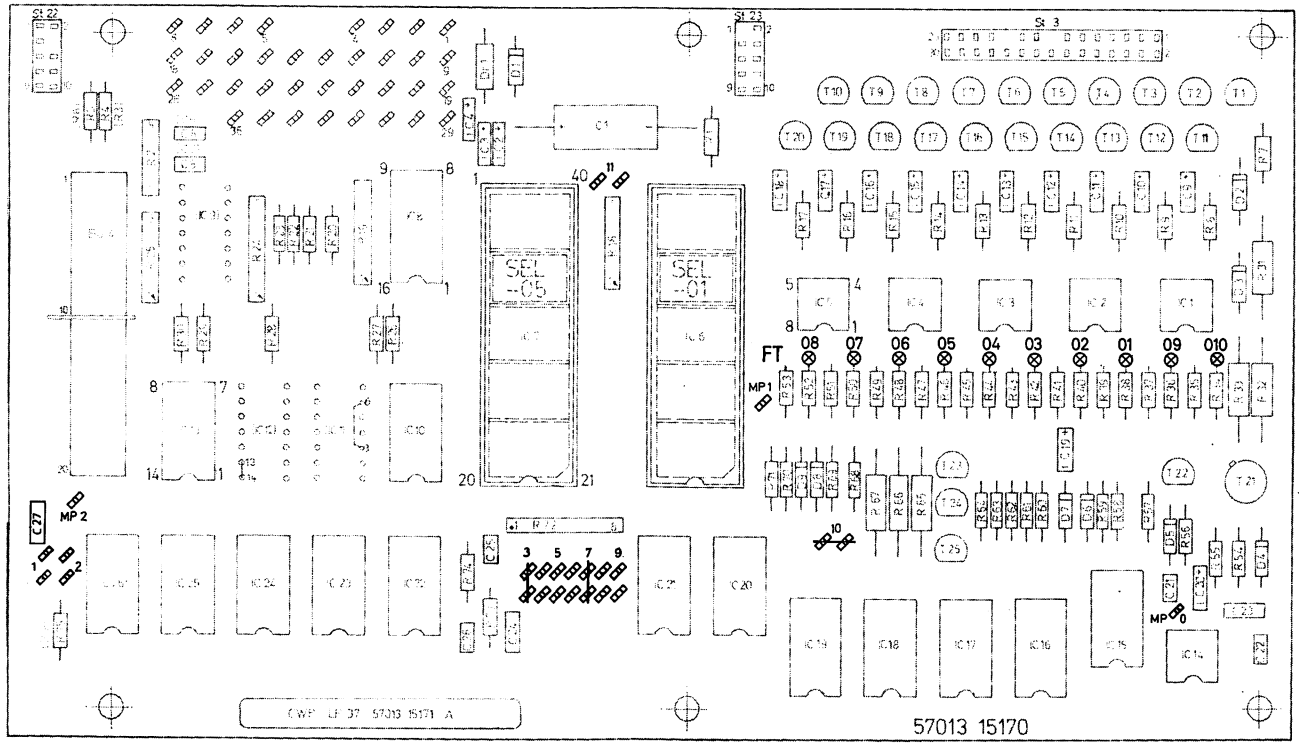
Strap 6 not inserted:
$\overline{SML}$ = 12 V: For keyboards **with** automatic Ltrs/Figs shift

Strap 6 inserted:
$\overline{SML}$ = 0 V: For keyboards **without** automatic Ltrs/Figs shift **and** featuring suppression of the combinations 6, 7, 8 in ZI (Figs) state.

| Straps[3]) | | Signal | |
|---|---|---|---|
| 5 | 7 | Bell | End of Line |
| not inserted | | — | No limitation of line length |
| × | | 62nd char. | 72nd char. |
| | × | 59th char. | 69th char. |
| × | × | 94th char. | 104th char. |

[3]) When changing the line length observe the adjustments 3.2.3., 3.2.6., 3.2.13., 3.2.14., 3.2.15., and 3.2.17.

**LP 37 Transmitter Control 57013 15171 A 02**
**(with Cable)**




Measuring Points:

MP 0: 0 V
MP 1: Pulse STAE
(start recognition ≙ recognition of a key operation)
MP 2: Start pulse for tape reader (STA)

Straps:

| Straps | | | Answer-back Units | |
|---|---|---|---|---|
| 1 | 2 | 3 | Internal Release | External Release |
| | | | 1 | |
| | × | | 1 and 2 | |
| | | × | 1 | 1 |
| × | | × | 1 | 1 and 2 |
| × | × | × | 1 and 2 | 1 and 2 |

Strap 3 inserted: $\overline{WD}$ = "0":
Answer-back unit 1 is released at reception of combination "WHO ARE YOU"

Strap 2 inserted: TAKG 1 = "1":
Answer-back unit 2 is released subsequently to answer-back unit 1 if answer-back unit key 1 is depressed

Strap 1 and 3 inserted: WD = "0":
Answer-back unit 2 is automatically released subsequently to answer-back unit 1

Strap 4 not inserted:
$\overline{SSL2}$ ≙ 12 V = 1.5 element stop signal

Strap 4 inserted:
$\overline{SSL2}$ ≙ 0 V = 2 element stop signal

The voltage drop over the respective collector resistance of the amplifier stage which is competent for the respective light channel in the keyboard, may be measured on the points FT 01 to 10. In local operation there must be measurable a voltage drop of ≥ 300 mV between the points ⊗ → MP 0 (meter 50 kohms/V).

(Strap 5 and 7 serve for setting the line length)

| Straps | | Signal | |
|---|---|---|---|
| 5 | 7 | Bell | End of Line |
| not inserted | | | No limitation of line length |
| × | | 62nd char. | 72nd char. |
| | × | 59th char. | 69nd char. |
| × | × | 94th char. | 104th char. |

When changing the line length observe the adjustments 3.2.3., 3.2.6., 3.2.13., 3.2.14., 3.2.15., and 3.2.17.

LP37 Transmitter Control 57013 15171 A02
(with Cable)

| Straps 6 | Straps 9 | 6th, 7th, and 8th Combination Figs. State | Ltrs./Figs. Automatic |
|---|---|---|---|
| | | not locked | active |
| | × | not locked | not active |
| × | × | locked | not active |
| × | | not practicable | |

Strap 8 not inserted:
no keyboard lock if double recognition

Strap 8 inserted:
keyboard lock if double recognition

Strap 10 not inserted:
$\overline{BAW} < 2$ s (may only be removed if IC 7 is not identical with SEL-04)

Strap 10 inserted:
$\overline{BAW} \geq 2$ s

Strap 11 not inserted:
IC 7 ≙ SEL-04 or 05

Strap 11 inserted:
IC 7 ≙ SEL-05A

Strap 12 not inserted (from soldering terminal 7 to 35):
break-in recognition ON

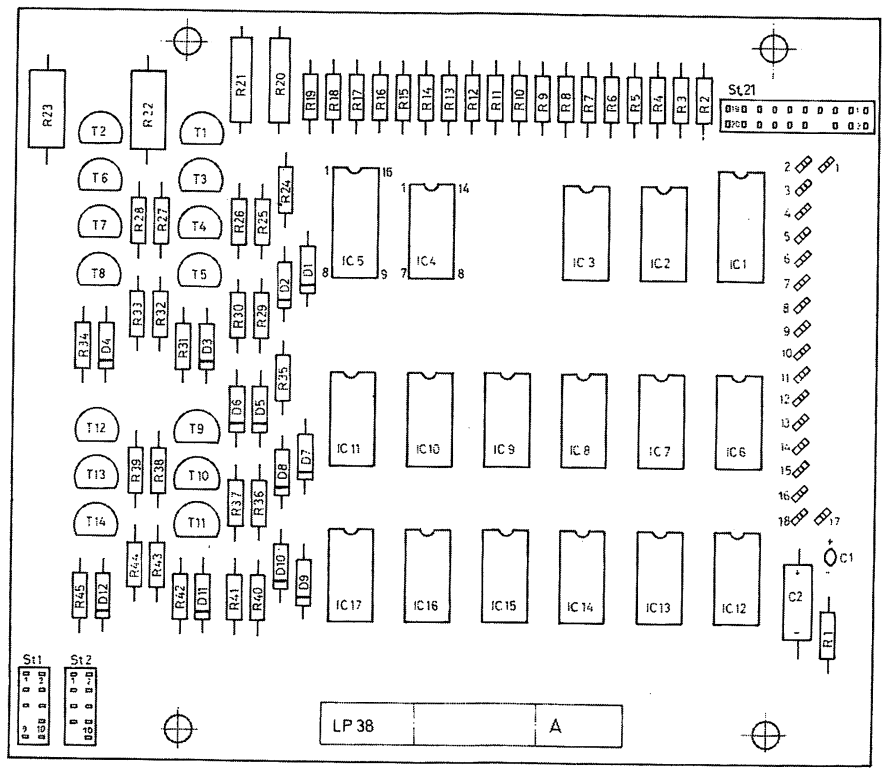
Strap 12 inserted:
break-in recognition switched OFF. Connection ED unripped at terminal 35

| Version Order No. | Straps 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Chip SEL- 05 | 05A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57013 15171 | | | × | | | | × | | | × | | | × | |
| 57013 15272 | | | × | | × | | × | | | × | | | × | |
| 57013 15274 | | | × | | | | × | × | | × | | | × | |
| 57013 15276 | | | × | | | | × | | × | | | × | × | |
| 57013 15278[1]) | | | × | | | | × | | | × | | | × | |
| 57013 15279 | | | | | | | × | | × | × | | | × | |
| 57013 50170 | | | × | | | | × | | | × | | × | × | |
| 57013 50171 | | | × | | | | × | | | × | × | | | × |
| 57013 50172 | | | × | | × | | | | × | × | | | × | |
| 57013 50173 | | | × | | × | | | | | × | | | × | |
| 57013 50174 | | | | | | | × | | | × | | | × | |
| 57013 50175 | | | | | × | | × | | | × | | × | × | |
| 57013 50176 | | | | | | | × | | | × | | × | × | |
| 57013 50178 | | | × | | | | × | | × | × | × | × | | × |
| 57013 50179 | | | × | | | | × | | × | | × | × | | × |
| 57013 51174 | | | × | | × | | × | × | | | | | × | |
| 57013 52171 | | | | | | | × | | × | | | | × | |
| 57013 53171 | | | × | | × | | | | | × | | | × | |
| 57013 53272 | | | × | | × | | | | × | | | | × | |

[1]) Connections from soldering terminals 8—12 and 14—28 inserted

| Connections | Function |
|---|---|
| 8—12 and 14—28 | inserted: indication (LD12, ON-OFF) by external cut-in and cut-off of reader<br>not inserted: no indication |

**LP 38 Tape Reader Control 57013 15181 A 01**
**(with Cable)**



# 4. STRAP MODIFICATIONS AND MEASURING POINTS

**CONTENTS** Page


**Printed Circuit Board LP 5**..... 4 — LP 5

**Printed Circuit Board LP 6**..... 4 — LP 6

**Printed Circuit Board LP 7**..... 4 — LP 7

**Printed Circuit Board LP 8**..... 4 — LP 8

**Printed Circuit Board LP 9**..... 4 — LP 9

**Printed Circuit Board LP 12**..... 4 — LP 12

**Printed Circuit Board LP 15**..... 4 — LP 15

**Printed Circuit Board LP 16**..... 4 — LP 16

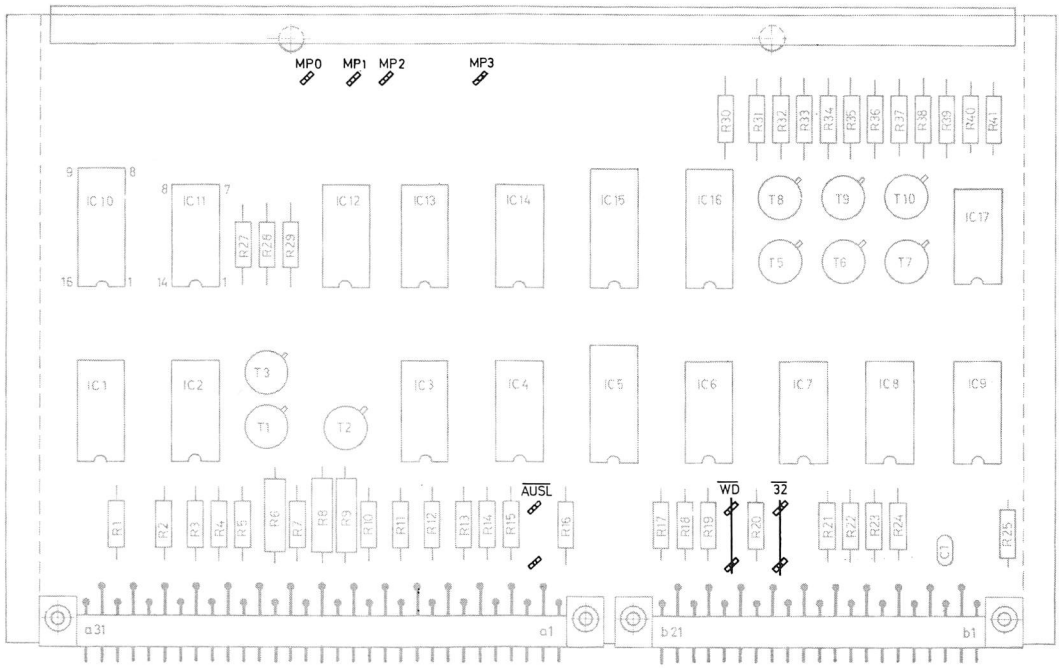
**Printed Circuit Board LP 37**..... 4 — LP 37

**Printed Circuit Board LP 38**..... 4 — LP 38


Note:

A ≙ Functional issue
× ≙ Strap inserted
Order No. ≙ Part No.

## LP 5 Tape Punch Control 57012 15150 A 01




Measuring Points:

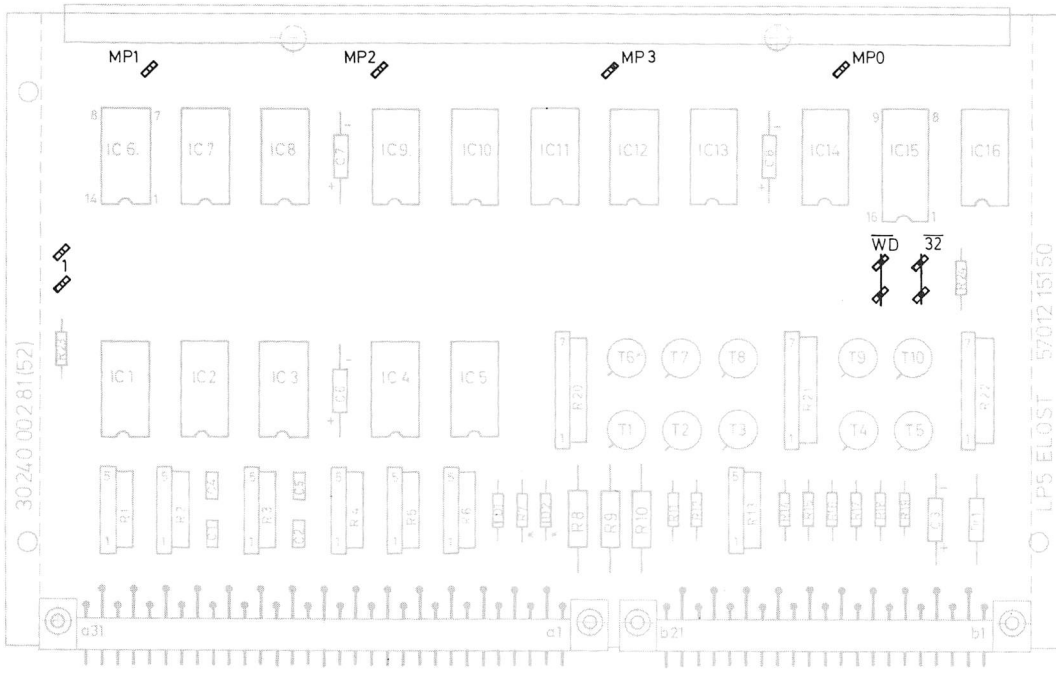
MP 0: 0 V
MP 1: Release pulse for energizing the tape punch feed magnet synchronized with zero pulse
MP 2: Signal "tape punch ON"
MP 3: Signal "Energizing of tape punch feed magnet" (MT)

Straps:

| Version (Order No.) | Mode of Operation[1]) | Straps | | |
|---|---|---|---|---|
| | | $\overline{32}$ | $\overline{WD}$ | $\overline{AUSL}$ |
| 57012 15150 | 32nd combination and Who Are You combination are not punched | × | × | |
| 57012 15152 | 32nd combination is punched | | × | |
| 57012 15153 | 32nd combination and Who Are You combination are punched | | | |
| 57012 15154 | Who Are You combination is punched | × | | |

[1]) For teleprinters with a character set of 96 characters (3 shift):
Notice the varied arrangements of straps on PCB 9, Printing Unit Control, for shifting into 3rd shift.

## LP 5 Tape Punch Control 57012 15150 A 02




Measuring Points:

MP 0: 0 V
MP 1: Release pulse for energizing the tape punch feed magnet synchronized with zero pulse (NIG 2)
MP 2: Signal "Tape punch ON"
MP 3: Signal "Energizing of tape punch feed magnet" (MT)

Straps:

| Version (Order No.) | Mode of Operation[1]) | Straps | | |
|---|---|---|---|---|
| | | $\overline{32}$ | $\overline{WD}$ | 1[2]) |
| 57012 15150 | 32nd combination and "Who Are You" combination are not punched | × | × | |
| 57012 15152 | 32nd combination is punched | | × | |
| 57012 15153 | 32nd combination and "Who Are You" combination are punched | | | |
| 57012 15154 | "Who Are You" combination is punched | × | | |

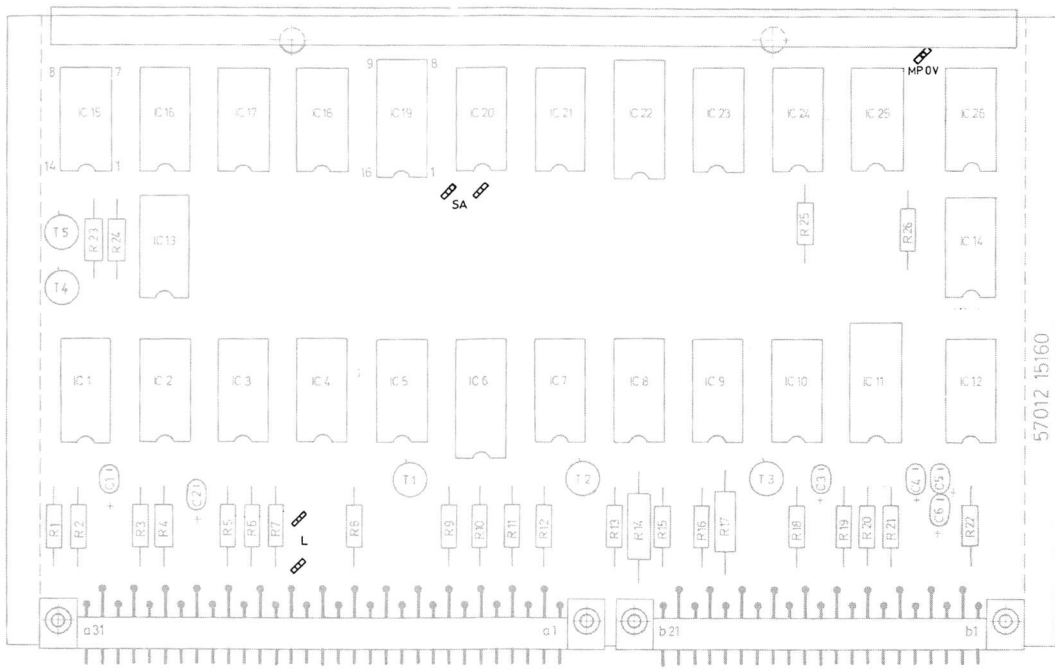
Note:

[1]) For teleprinters with a character set of 96 characters (3 shift): Notice the varied arrangements of straps on PCB 9, Printing Unit Control, for shifting into 3rd shift.

[2]) Strap 1 for tape run out (V) and BAW:
inserted: 4 times punched combination "32"
not inserted: 4 times punched combination "Ltrs"

N/A

**LP 6 Subscriber Unit 1 57012 15160 A 01**

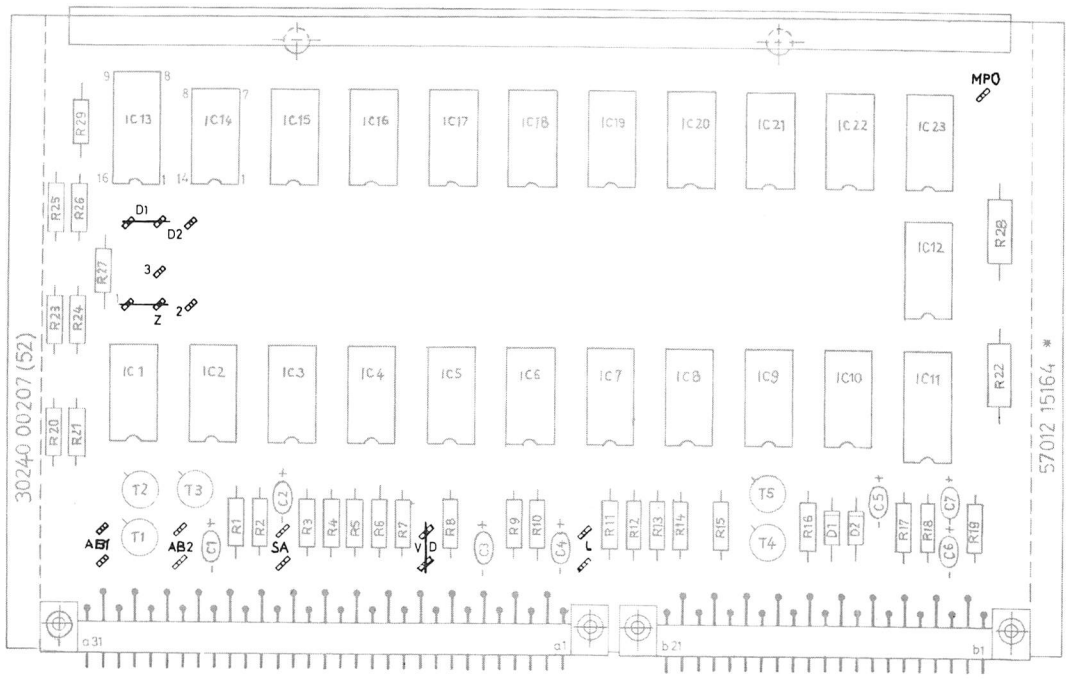



Measuring Point:
MP 0: 0 V

Straps:

| Version (Order No.) | Mode of Operation | Straps | |
|---|---|---|---|
| | | L | SA |
| 57012 15160 | German Telex | | |
| | End-of-paper contact is effective in local operation too, additionally to telex operation | × | |
| | At end of paper no calling from outside is possible with collective connection | | × |

**LP 6 Subscriber Unit 1 57012 15164 A 01**




Straps:

| Version (Order No.) | Straps | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AB1 | AB2 | D1 | D2 | L | SA | VD | Z1 | Z2 | Z3 |
| 57012 15164 | | | × | | | | × | × | | |

Strap AB 1 inserted:
for ED 1000 systems with SEU-B and B-signalling

Strap AB 2 inserted:
for double-current systems with A-signalling

Strap AB 1 and AB 2 not inserted:
Mode set by replacement of line adaptation

Strap D 1 inserted:
105 ms switch-overtime in double-current systems and B-signalling

Strap D 2 inserted:
425 ms switch-overtime in double-current systems and B-signalling

Strap D 1 and D 2 not inserted:
no switch-overtime in double-current systems

Strap L inserted:
End-of-paper contact active at local operation too

Strap L not inserted:
End-of-paper contact not active at local operation

Strap SA inserted:
for subscriber with collective numbers

Strap SA not inserted:
for subscribers with exclusive exchange line

Strap VD inserted:
Half Duplex

Strap VD not inserted:
Full Duplex

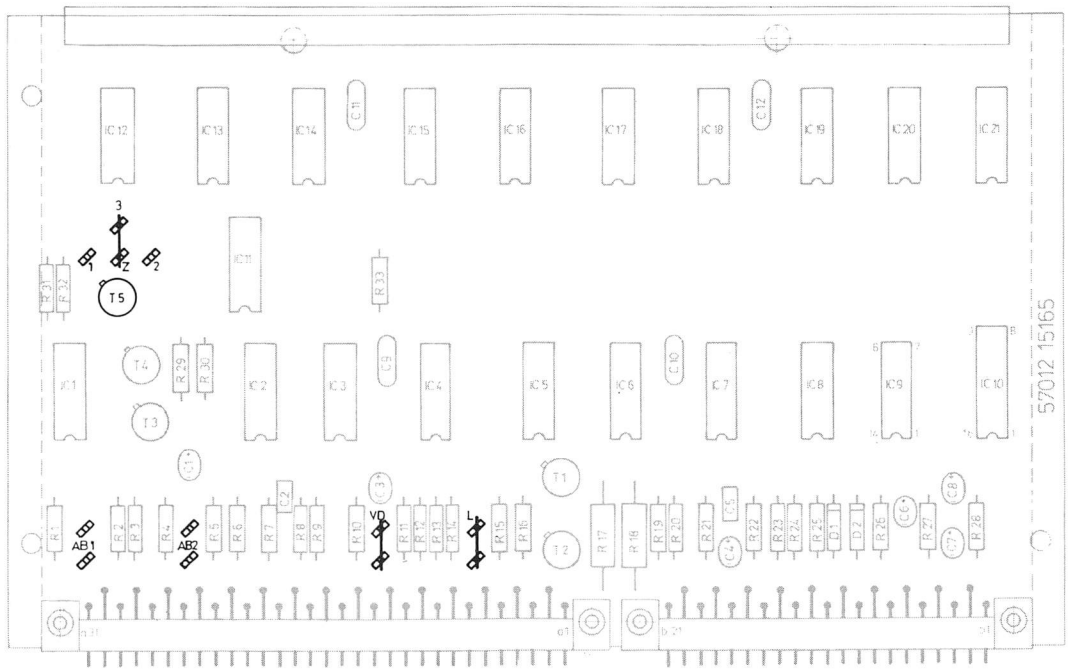
Strap Z 1 inserted:
$\overline{\text{BAW}}$ approx. 2.9 s

Strap Z 2 inserted:
$\overline{\text{BAW}}$ approx. 1.5 s

Strap Z 3 inserted:
$\overline{\text{BAW}}$ approx. 900 ms

Strap Z 1, Z 2, Z 3 not inserted:
$\overline{\text{BAW}}$ approx. 300 ms

**LP 6 Subscriber Unit 1 57012 15165 A 02**

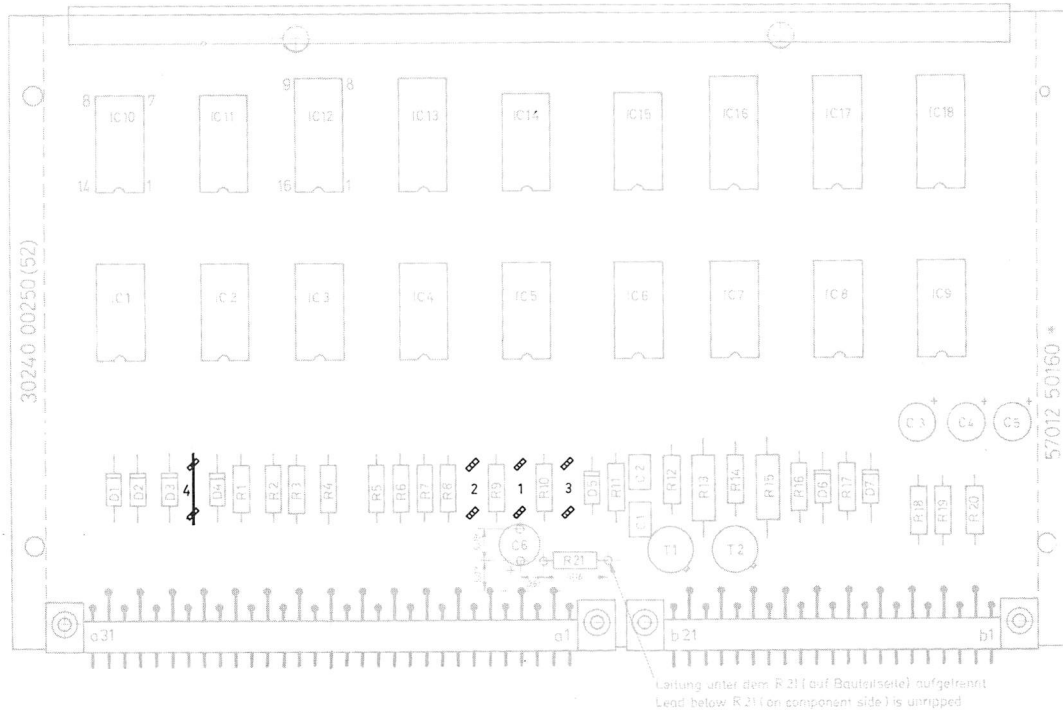



Straps:

| Version (Order No.) | Straps | | | | | | |
|---|---|---|---|---|---|---|---|
| | AB1 | AB2 | L | VD | Z1 | Z2 | Z3 |
| 57012 15165 | | | × | × | | | × |

| | |
|---|---|
| Strap "AB 1" inserted: | ED 1000 systems with SEU-B and B-signaling |
| Strap "AB 2" inserted: | Polar direct current systems with A-signaling |
| Strap "AB 1" and "AB 2" not inserted: | Mode set by replacing the line adaptation |
| Strap L inserted: | End-of-paper contact active at local operation |
| Strap L not inserted: | End-of-paper contact not active at local operation |
| Strap VD inserted: | Half duplex |
| Strap VD not inserted: | Full duplex |
| Strap Z 1 inserted: | $\overline{\text{BAW}}$ approx. 2.9 s |
| Strap Z 2 inserted: | $\overline{\text{BAW}}$ approx. 1.5 s |
| Strap Z 3 inserted: | $\overline{\text{BAW}}$ approx. 900 ms |
| Straps Z 1, Z 2, Z 3 not inserted: | $\overline{\text{BAW}}$ approx. 300 ms |

## LP 6 Interface V. 24 MODEM/DATEX 57012 50160 A 01



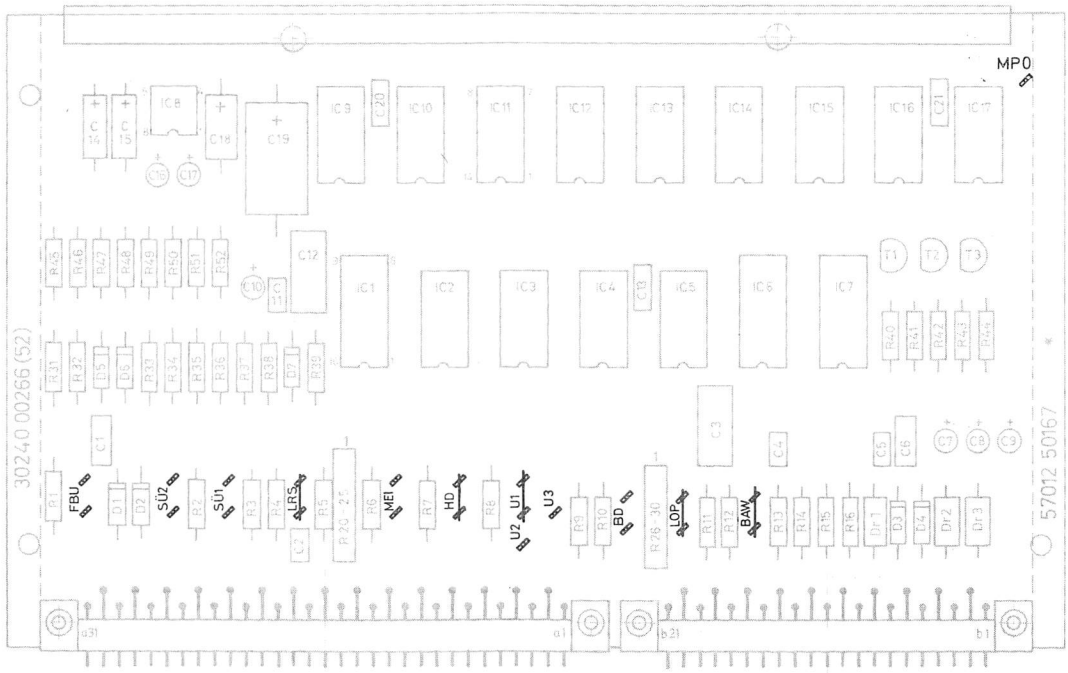

Lead below R21 (on component side) is ~~unripped~~ CUT (open cotto include R21)

Straps:

| Version (Order No.) | Straps 1 | 2 | 3 | 4 | Mode of Operation |
|---|---|---|---|---|---|
| 57012 50160 | | | | × | Interface V. 24 DATEX |
| 57012 51160 | × | × | | × | Interface V. 24 MODEM (for MODEM connection by means of telephone *with* data key) |
| 57012 50163 | × | × | × | × | Interface V. 24 MODEM (for MODEM connection by means of telephone *without* data key) |

Strap 4 is to be removed for duplex operation.

## LP 6 Subscriber Unit 1 STmL 57012 50167 A 01




Measuring Point:
MP 0 = 0 V

Straps:

| Version Order No. | Straps | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | U1 | U2 | U3 | FBU | SÜ1 | SÜ2 | HD | BD | MEI | BAW | LOP | LRS |
| 57012 50167 | × | | | | | | × | | | × | × | × |
| 57012 51167 | × | | | | | | × | × | | × | × | |
| 57012 52167 | | | × | | | | | | | × | × | × |
| 57012 53167 | | | | | | | | | | | × | × |
| 57012 54167 | × | | | | | | × | | | × | | × |
| 57012 55167 | | | | | | | | | | × | × | |
| 57012 56167 | | | | | × | × | | | | | × | |

LP 6 Subscriber Unit 1 STmL 57012 50167 A 01

Brückenkombinationen / Strap Combinations:
(× ≙ Brücke eingelegt / × ≙ Strap inserted)

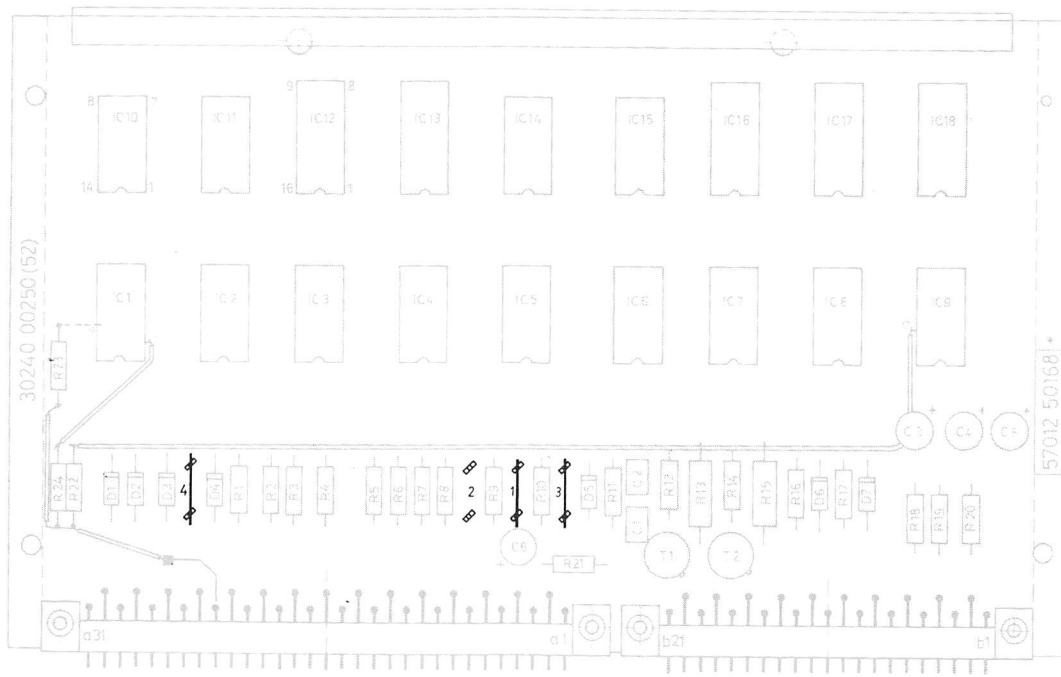
| Farbbandsteuerung / Color ribbon control | | | | |
|---|---|---|---|---|
| Brücken / Straps | | | | Funktion / Function |
| U1 | U2 | U3 | FBU | |
| | | | | Dauernd untere Farbbandhälfte / Continuously lower color ribbon half |
| | | × | | Dauernd obere Farbbandhälfte / Continuously upper color ribbon half |
| | | × | × | Externe Farbbandsteuerung / External color ribbon control |
| × | | | | Automatische Farbbandsteuerung bei HD Half Duplex<br>Sendebetrieb ≙ obere Farbbandhälfte; Empfangsbetrieb ≙ untere Farbbandhälfte<br>Automatic color ribbon control during HD<br>Transmit operation ≙ upper color ribbon half; Receive operation ≙ lower color ribbon half |
| | × | | | Automatische Farbbandsteuerung bei HD<br>Sendebetrieb ≙ untere Farbbandhälfte; Empfangsbetrieb ≙ obere Farbbandhälfte<br>Automatic color ribbon control during HD<br>Transmit operation ≙ lower color ribbon half; Receive operation ≙ upper color ribbon half |

Leitungsüberwachung / Line Monitoring

| Brücken / Straps | | Funktion / Function |
|---|---|---|
| SÜ1 | SÜ2 | |
| × | | Blinken der Anzeige hinter der Anruftaste und Summer-Signal bei Leitungsunterbrechung<br>Flashing of the indication behind the call button and buzzer signal when line interruption |
| | × | »Motor aus« bei Leitungsunterbrechung<br>"Motor OFF" when line interruption |
| × | × | Blinken, Summer-Signal und »Motor aus« bei Leitungsunterbrechung<br>Flashing, buzzer signal and "Motor OFF" when line interruption |
| nicht eingelegt<br>not inserted | | Keine Leitungsüberwachung<br>No line monitoring |

| |
|---|
| HD eingelegt / inserted: Halbduplex / half duplex<br>HD nicht eingelegt / not inserted: Vollduplex / full duplex |
| BD eingelegt / inserted: 75-, 100-Bd-Betrieb / 75-,100-Bd operation<br>BD nicht eingelegt / not inserted: 50-Bd-Betrieb / 50-Bd operation |
| MEI eingelegt / inserted: »Motor EIN« mit »Netz EIN« / "Motor ON" with "Power ON"<br>MEI nicht eingelegt / not inserted: Normalversion / normal version |
| BAW eingelegt / inserted: BAW-Zeit 2,1 s / BAW time 2.1 s<br>BAW nicht eingelegt / not inserted: BAW-Zeit 426 ms / BAW time 426 ms |
| LOP eingelegt / inserted: Lokal-Betrieb-Priorität aus / local operation priority off<br>LOP nicht eingelegt / not inserted: Lokal-Betrieb-Priorität ein / local operation priority on |
| LRS eingelegt / inserted:<br>obere Farbbandhälfte im Lokal-Betrieb / upper half of color ribbon by local operation<br>LRS nicht eingelegt / not inserted:<br>untere Farbbandhälfte im Lokal-Betrieb / lower half of color ribbon by local operation |

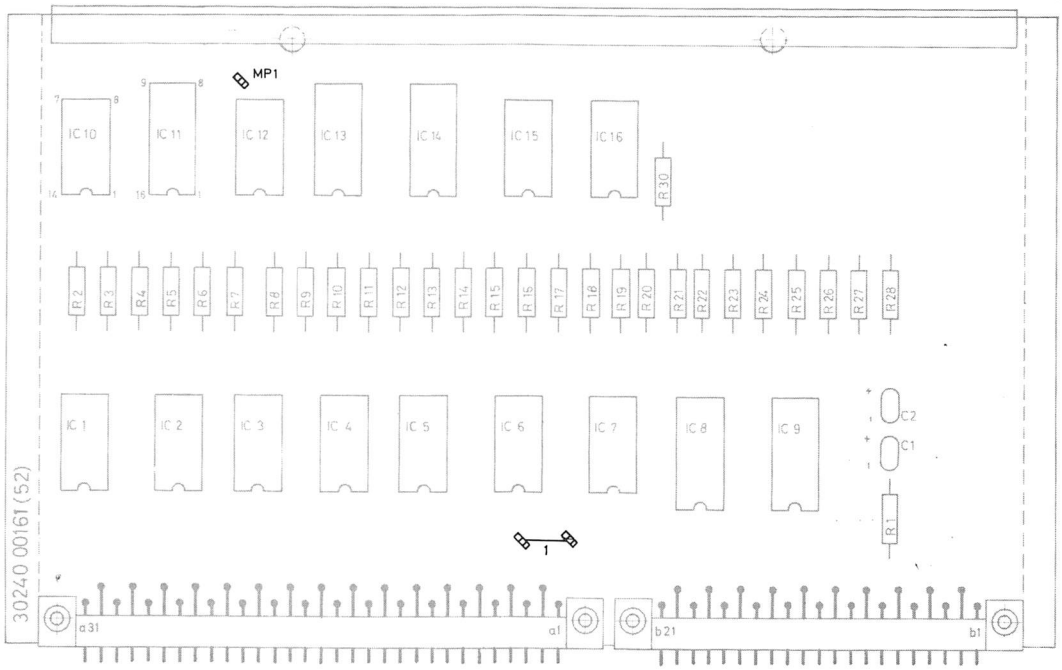
**LP 6 V. 28 U 57012 50168 A 01**




Straps:

Strap 1 and 2 inserted: for MODEM connection *with* dataphone
Strap 1, 2, and 3 inserted: for MODEM connection with telephone *without* data key
Strap 1, 2, and 3 not inserted: for DATEX connection
Strap 4 inserted: half-duplex operation
Strap 4 not inserted: full-duplex operation

**LP 7 Subscriber Unit 2 57012 15170 A 01**



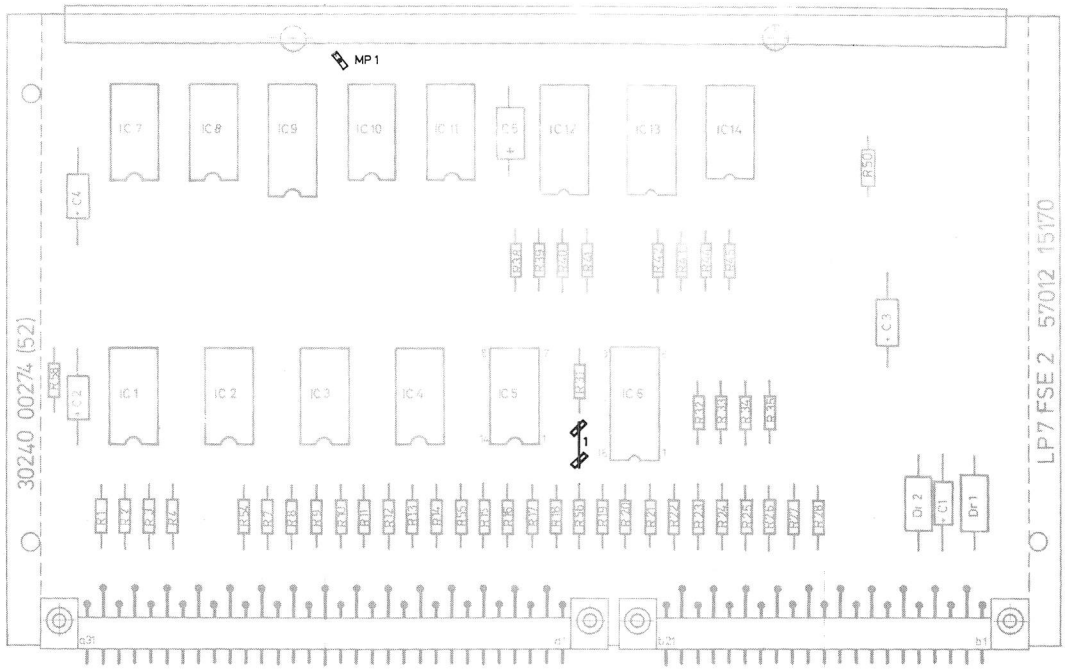

Measuring Point:

MP 1: Select pulses (WI)

Straps:

| Version (Order No.) | Mode of Operation | Strap 1 |
|---|---|---|
| 57012 15170 | Generation of select pulses during the select phase | × |
| | Suppression of generation of select pulses | |

**LP 7 Subscriber Unit 2 57012 15170 A 02**

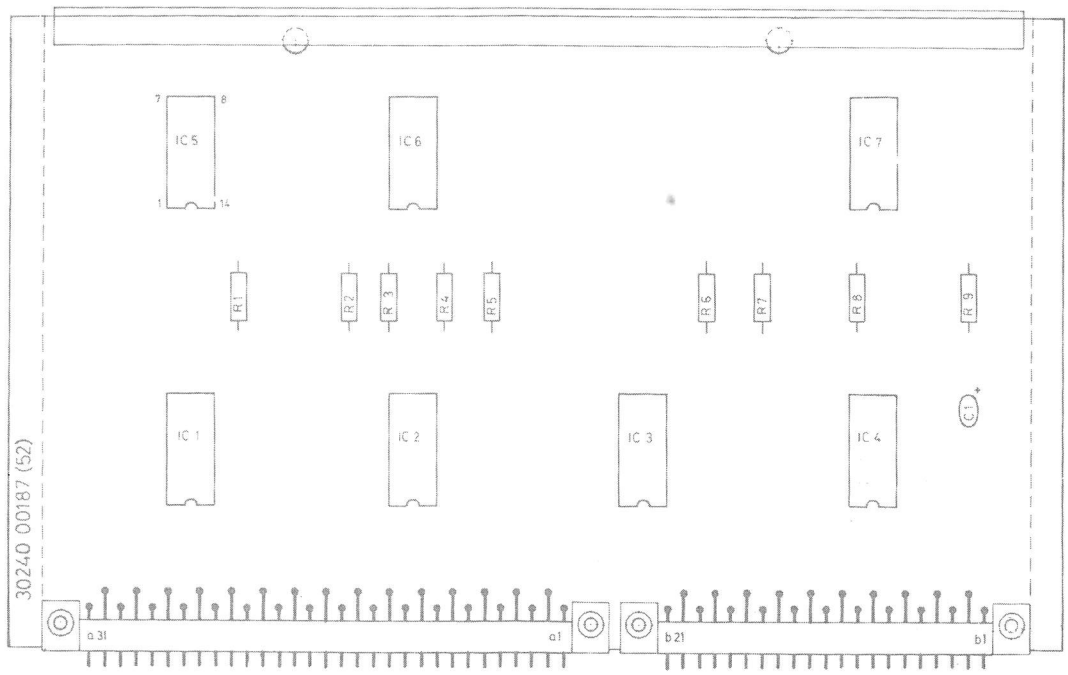



Measuring Point:
MP 1: Select pulses (WI)

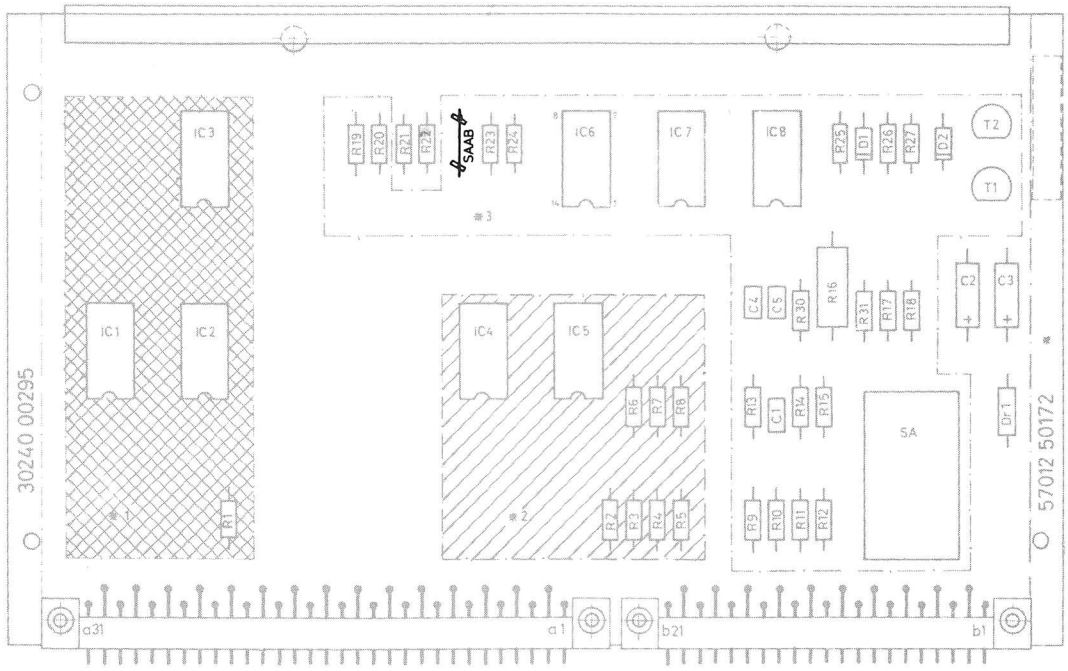
Straps:

| Version (Order No.) | Mode of Operation | Strap 1 |
|---|---|---|
| 57012 15170 | Generation of select pulses during the select phase | × |
| | Suppression of generation of select pulses | |

## LP 7 Subscriber Unit 2T 57012 15172 A01



**LP 7 Subscriber Unit 2 57012 50172 A 02**




57012 51172 *1 and *2 not equipped

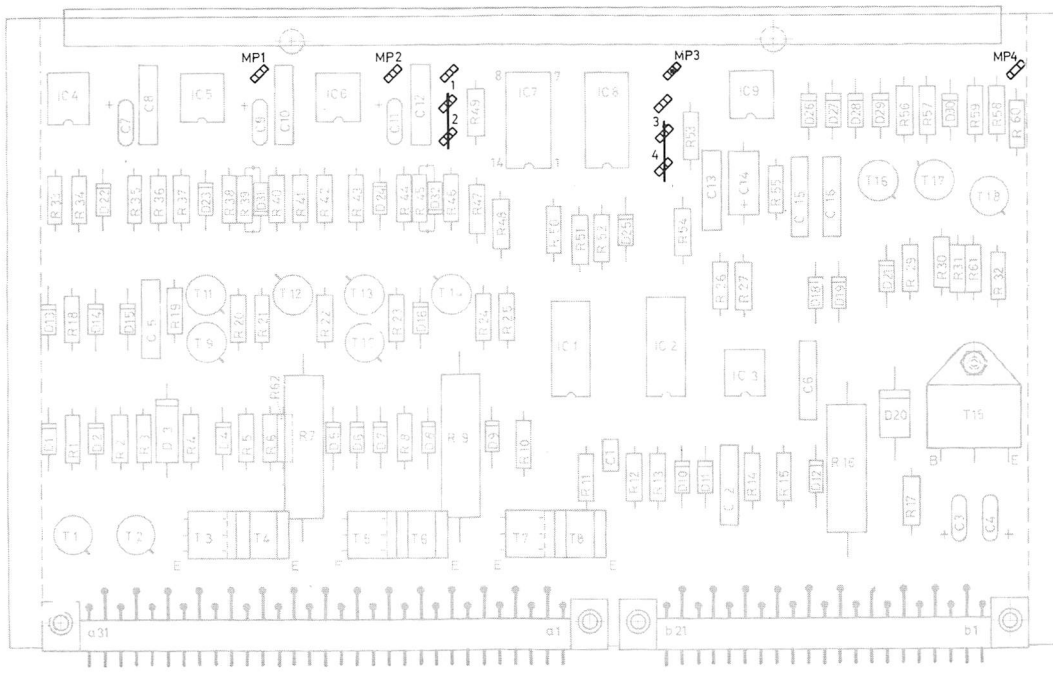
57012 15172 *3 not equipped

57012 50172 all equipped

Strap SAAB inserted:
latched signal "incoming call" (ex. alarm) will be cleared by "incoming clearing" signal

Strap SAAB not inserted:
latched signal "incoming call" (ex. alarm) will **not** be cleared by "incoming clearing" signal

## LP 8 Final Stages 57012 15180 A 01




Measuring Points:

MP 1: Basic setting signal ($\overline{GRS}$)
MP 2: Counting pulses digitalized ($\overline{ZIG\ 1}$)
MP 3: Zero pulses digitalized ($\overline{NIG\ 1}$)
MP 4: Stroboscope output for type bar adjustment ($\overline{AW}$)

Strap 1 inserted: Timing pulses every 18 seconds

Strap 3 inserted: Timing pulses every 27 seconds

Strap 4 inserted: Timing pulses every 36 seconds

Straps 2 and 4 inserted: Timing pulses in local operation every 18 seconds, in 50-Bd telegraph operation every 36 seconds

Straps 2 and 3 inserted: Timing pulses in local operation every 18 seconds, in 75-Bd telegraph operation every 27 seconds

**Attention:**

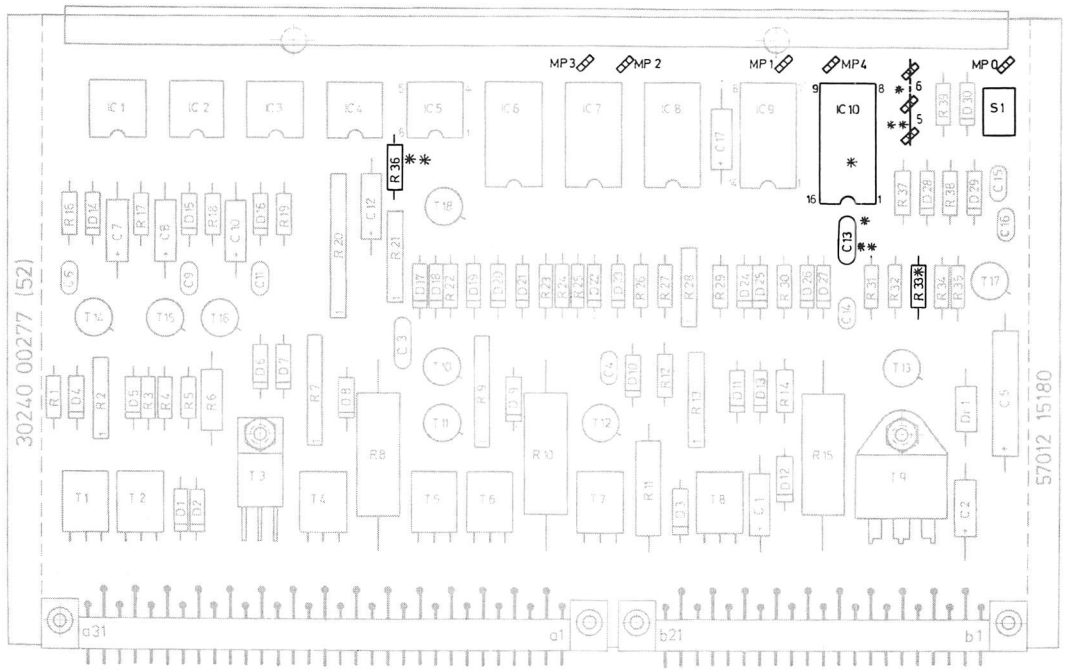
The combinations 1 and 2 as well as 3 and 4 are prohibited on account of the destruction hazard for ICs.

Straps:

| Version (Order No.) | Mode of Operation[1] (Timing Pulses for Maintenance Unit Counter) | Straps | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| | | 100 | LOCAL | 75 | 50 |
| 57012 15180 | Local 100 Bd, telegraph line 50 Bd | | × | | × |
| 57012 50180 | Local 50 Bd, telegraph line 50 Bd | | | | × |
| 57012 51180 | Local 75 Bd, telegraph line 75 Bd | | | × | |
| 57012 52180 | Local 100 Bd, telegraph line 100 Bd | × | | | × |

[1]) Observe the varied arrangements of straps for printing speed on PCB 9, Printing Unit Control.

**LP 8 Final Stages 57012 15180 A 02 ****
**57012 15182 A 02 ***




Measuring Points:

MP 1: Basic setting signal ($\overline{GRS}$)
MP 2: Counting pulses digitalized ($\overline{ZIG\,1}$)
MP 3: Zero pulses digitalized ($\overline{NIG\,1}$)
MP 4: Stroboscope output for type bar adjustment ($\overline{AW}$)

* Only for 3-shift version (96 characters)
** Only for 2-shift version (64 characters)

Switch:

Switch for setting up the counting pulses for maintenance unit counter

| Mode of Operation[1]) | Switch Position | | | |
|---|---|---|---|---|
| | 50 (4) | 75 (3) | 100 (1) | Local (2) |
| Local 100 Bd, telegraph line 100 Bd | x [2]) | x [2]) | x | |
| Local 100 Bd, telegraph line 50 Bd | x | | | x |
| Local 100 Bd, telegraph line 75 Bd | | x | | x |

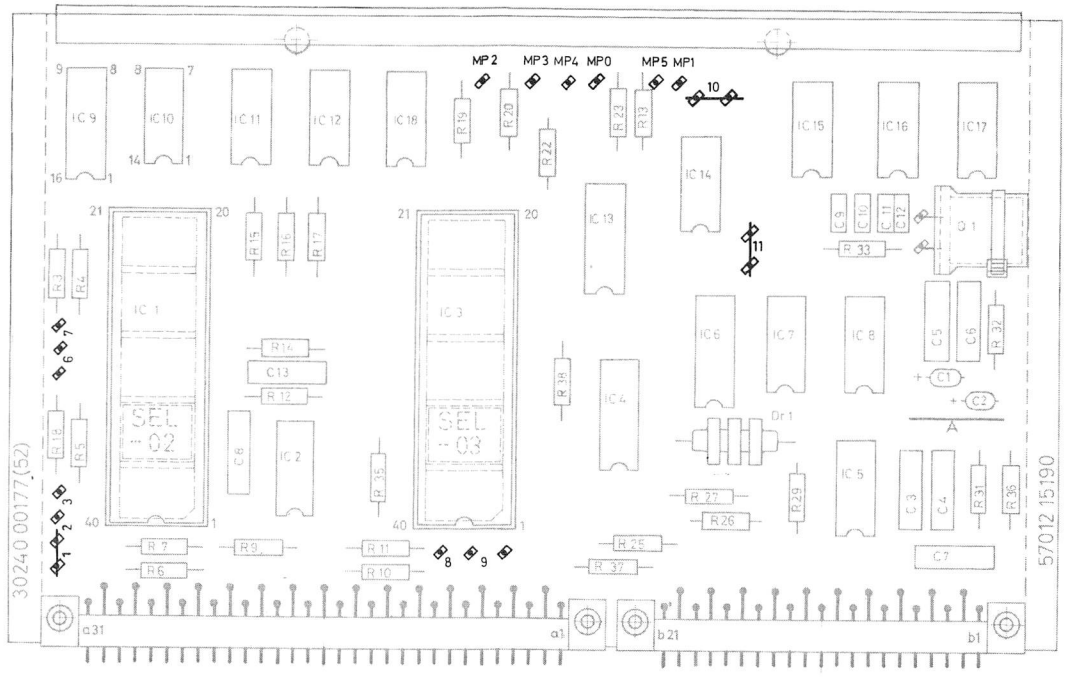
[1]) Observe the varied arrangements of straps for telegraph speed on PCB 9, Printing Unit Control
[2]) Both switch positions are possible because 100 Bd is dominant

Straps:

If the teleprinter is a 2-shift version, strap 5 must be inserted.
In the 3-shift version (96 characters), strap 6 must be inserted.
In addition, R36 is removed and C13(0.022 $\mu$F) is replaced by 6800 pF.
R33 and IC10 are added.

| Order No. | Version | Straps | | R33 | R36 | C13 | IC10 |
|---|---|---|---|---|---|---|---|
| | | 5 | 6 | | | | |
| 57012 15180 | 2 shift (64 characters) | × | | — | × | 0.022 $\mu$F | |
| 57012 15182 | 3 shift (96 characters) | | × | × | — | 6800 pF | × |

## LP 9 Printing Unit Control 57012 15190 A 01




Measuring Points:

MP 0: 0 V
MP 1: Signal "Character available" (ZV)
MP 2: Signal BUSY 3
MP 3: Signal "Selection pulse" ($\overline{AW}$)
MP 4: 307.2-kHz-clock pulse
MP 5: Signal "Select magnet" ($\overline{AWM}$)

Straps:

| Version (Order No.) | Mode of Operation[1] (Telegraph Speed in Bauds) | Straps | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 10 | 11 |
| 57012 15190 | Local 100 Bd, telegraph line 50 Bd | × | | | × | × |
| 57012 15196[2] | Local 100 Bd, telegraph line 50 Bd | × | | | × | × |
| 57012 51190 | Local 100 Bd, telegraph line 75 Bd | × | | × | × | × |
| 57012 52190 | Local 100 Bd, telegraph line 100 Bd | | × | | × | × |
| 57012 52196[2] | Local 100 Bd, telegraph line 100 Bd | | × | | × | × |

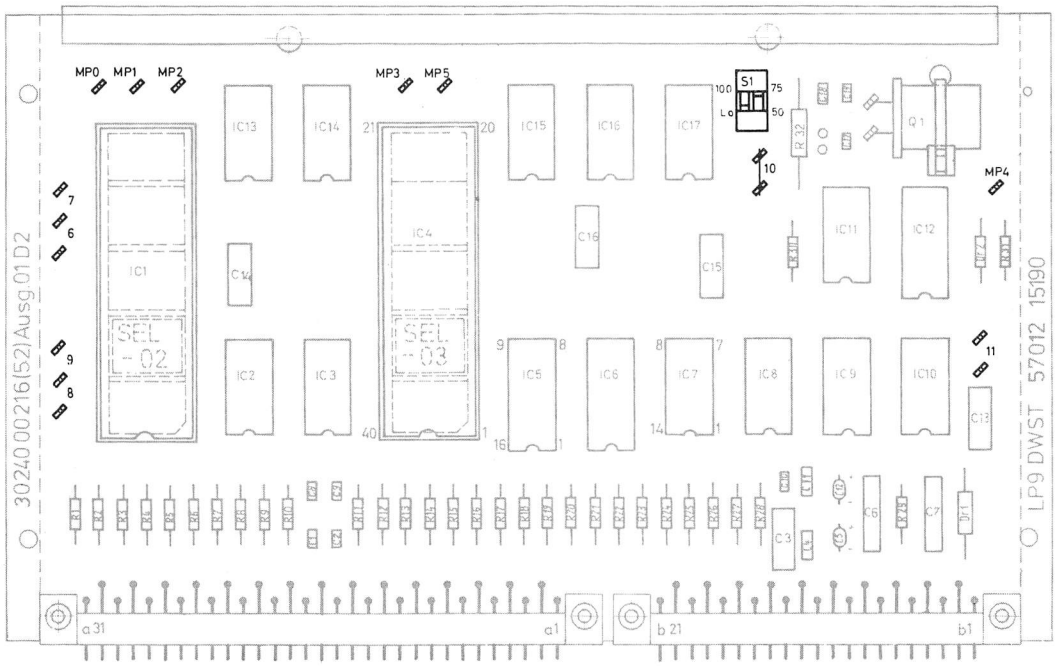
interruption straps for measuring clock T and G 192

| Straps | | | | |
|---|---|---|---|---|
| 6 | 7 | 8 | 9 | |
| × | | | | 3rd shift by 4 times S sequence |
| | × | | | 3rd shift by 32nd combination |
| | | × | | Automatic line feed when carriage return |
| | | | × | Automatic carriage return when line feed |

[1]) When changing the telegraph speed observe the varied arrangements of straps on PCB 8, Final Stages

[2]) That means 104 characters/line; clock T1 = T2

## LP 9 Printing Unit Control 57012 15190 A 02




Measuring Points:

MP 0: 0 V
MP 1: Signal "Character available"
MP 2: Signal BUSY 3
MP 3: Signal "Selection pulse" ($\overline{AW}$)
MP 4: 307.2-kHz-clock pulse
MP 5: Signal "Select magnet" ($\overline{AWM}$)

Straps:

| Version Order No. | Straps | | | | | |
|---|---|---|---|---|---|---|
| | 6 | 7 | 8 | 9 | 10 | 11 |
| 57012 15190 | | | | | × | |
| 57012 50190 | | | | | × | × |

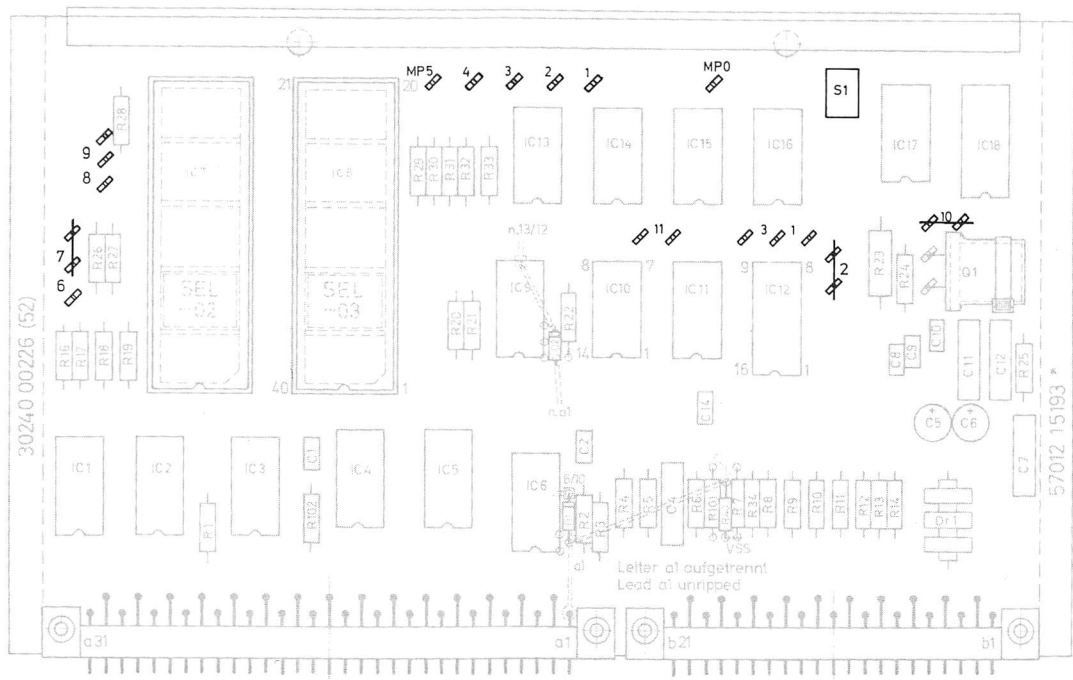
Switch 1:

| Mode of Operation[1]) (Telegraph Speed in Bauds) | Switch Position | | | |
|---|---|---|---|---|
| | 1/I | | 1/II | |
| | Local | 100 | 50 | 75 |
| Local 100 Bd, telegraph line 50 Bd | × | | × | |
| Local 100 Bd, telegraph line 75 Bd | × | | | × |
| Local 100 Bd, telegraph line 100 Bd | | × | random position | |

[1]) When changing the telegraph speed observe the varied arrangements of straps on PCB 8, Final Stages

| Strap | Function |
|---|---|
| 6 | inserted: changing to the 3rd shift by 4 times S |
| 7 | inserted: changing to the 3rd shift by 32nd combination |
| 8 | inserted: automatic LF with CR |
| 9 | inserted: automatic CR with LF |
| 10 | always inserted |
| 11 | inserted: automatic CR and LF from the end of line switch |

## LP 9 Printing Unit Control 96 Characters 57012 15193 A 01




Measuring Points:

MP 0: 0 V
MP 1: Signal "Character available" (ZV)
MP 2: Signal BUSY 3
MP 3: Signal "Selection pulse" ($\overline{AW}$)
MP 4: 307.2-kHz-clock pulse (T)
MP 5: Signal "Select magnet" ($\overline{AWM}$)

Straps and Switch:

| Version / Order No. | Straps | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 6 | 7 | 8 | 9 | 10 | 11 |
| 57012 15193 | | × | | | × | | | × | |
| 57012 50193 | | × | | | × | | | × | × |
| 57012 51193 | × | | | | | | | × | × |

Switch S1:

Slide switch S1 serves for telegraph speed adjustment.
The teleprinter can be set to the following telegraph speeds:

| Telegraph Speed[1]) in Bauds | |
|---|---|
| Local Operation | Telegraph Operation |
| 100 | 50 |
| 100 | 75 |
| 100 | 100 |

[1]) When changing the telegraph speed observe the varied arrangements of straps on PCB 8, Final Stages

| Strap | Function (strap inserted) |
|---|---|
| 1 | 64 characters (2-shift) |
| 2 | 96 characters (3-shift) |
| 3 | 128 characters (4-shift) |
| 6 | changing to the 3rd shift by 4 times S |
| 7 | changing to the 3rd shift by 32nd combination |
| 8 | automatic LF with CR |
| 9 | automatic CR with LF |
| 10 | always inserted |
| 11 | automatic CR and LF from the end-of-line switch |

## LP 9 Printing Unit Control 1-F Code 57012 15195 A 01

Measuring Points:

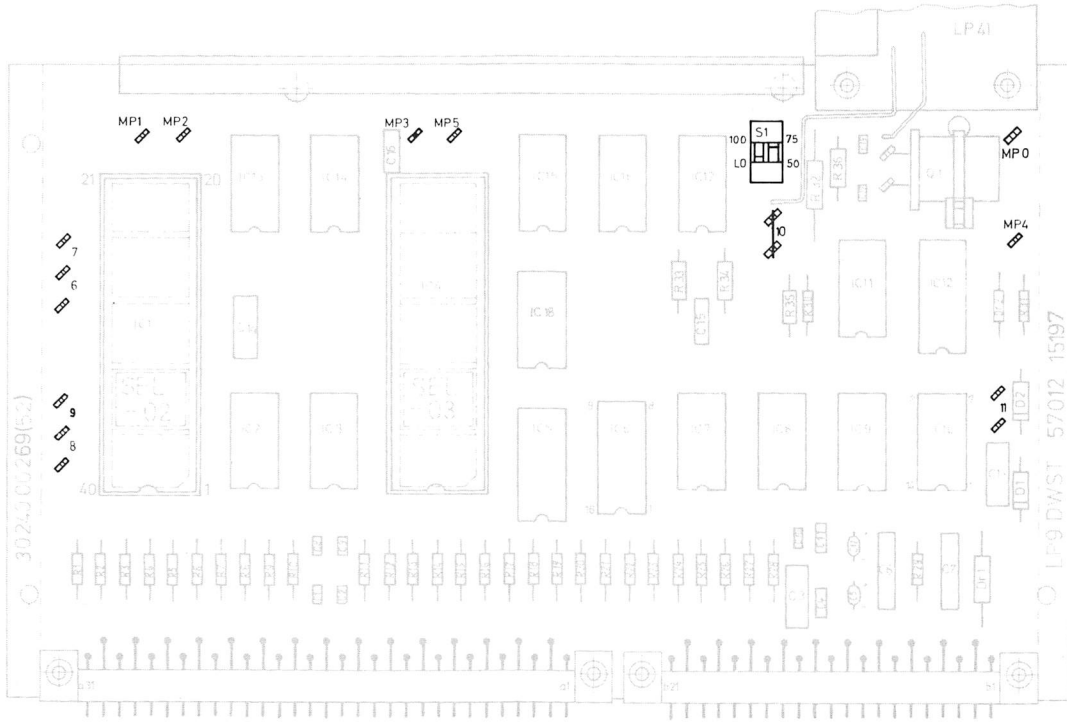
MP0: 0 V
MP3: Signal "Selection pulse" ($\overline{AW}$)
MP5: Signal "Select magnet" ($\overline{AWM}$)

Straps:

| Version Order No. | Straps | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 57012 15195 | | × | × | | | × | | | × |
| 57012 50195 | × | × | × | | | × | | | × |

| Strap inserted | Function |
|---|---|
| 1 | automatic CR and LF from the end-of-line switch |
| 2 | no printing unit feed, programmed |
| 3 | 2-shift |
| 4 | 3-shift |
| 5 | 4-shift |
| 6 | 7-bit code |
| 7 | 5-bit code |
| 8 | automatic CR with LF |
| 9 | automatic LF with CR |

## LP 9 Printing Unit Control 57012 15197 A 02




Measuring Points:

MP 0: 0 V
MP 1: Signal "Character available" (ZV)
MP 2: Signal BUSY 3
MP 3: Signal "Selection pulse" ($\overline{AW}$)
MP 4: 307.2-kHz-clock pulse (T)
MP 5: Signal "Select magnet" ($\overline{AWM}$)

Straps and Switch:

| Strap inserted | Function |
|---|---|
| 6 | changing to 3rd shift by 4 times S |
| 7 | changing to 3rd shift by 32nd combination |
| 8 | automatic LF with CR |
| 9 | automatic CR with LF |
| 10 | always inserted |
| 11 | automatic CR and LF from the end-of-line switch |

Switch S1:

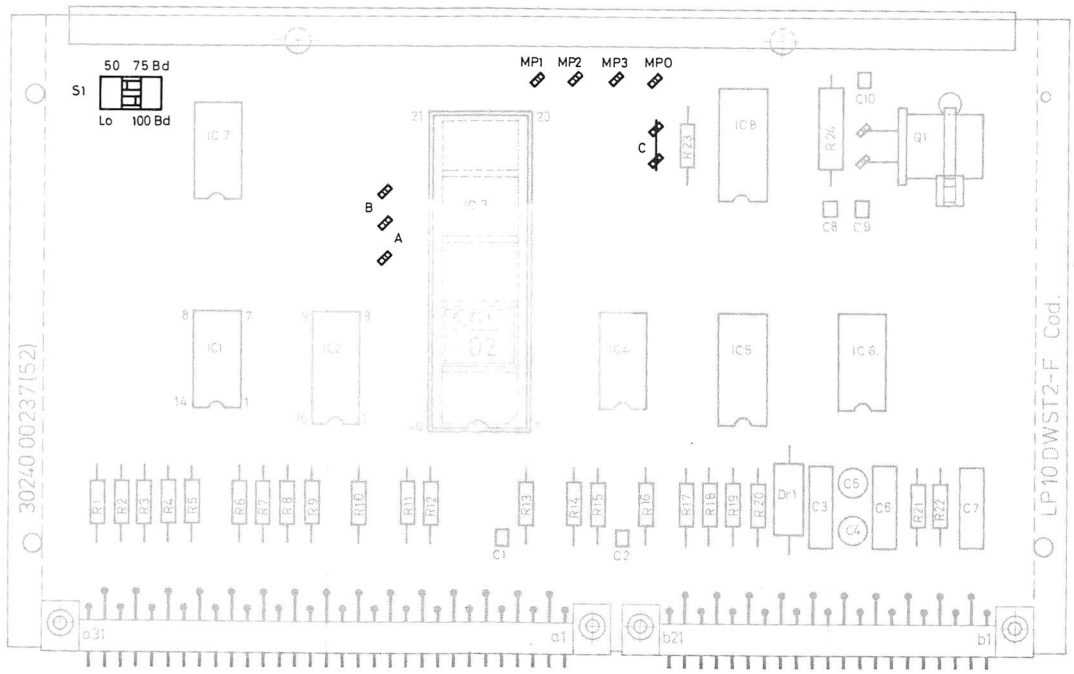
Switch S1 is used for setting up the telegraph speeds indicated below.

| Switch Position | | | | Telegraph Speed in Bauds | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | Local Operation | Telegraph Operation |
| × | | × | | 100 | 50 |
| × | | | × | 100 | 75 |
| | × | — | — | 100 | 100 |

Switch LP 41:

Switch LP 41 is used for switching off the printing unit. Any incoming data can still however be punched.

## LP 10 Printing Unit Control 2-F Code 57012 15202 A 01




Measuring Points:

MP 0: 0 V
MP 1: Signal BUSY 3
MP 2: Signal "Character available" (ZV)
MP 3: 307.2-kHz-clock pulse (T)

Straps and Switch:

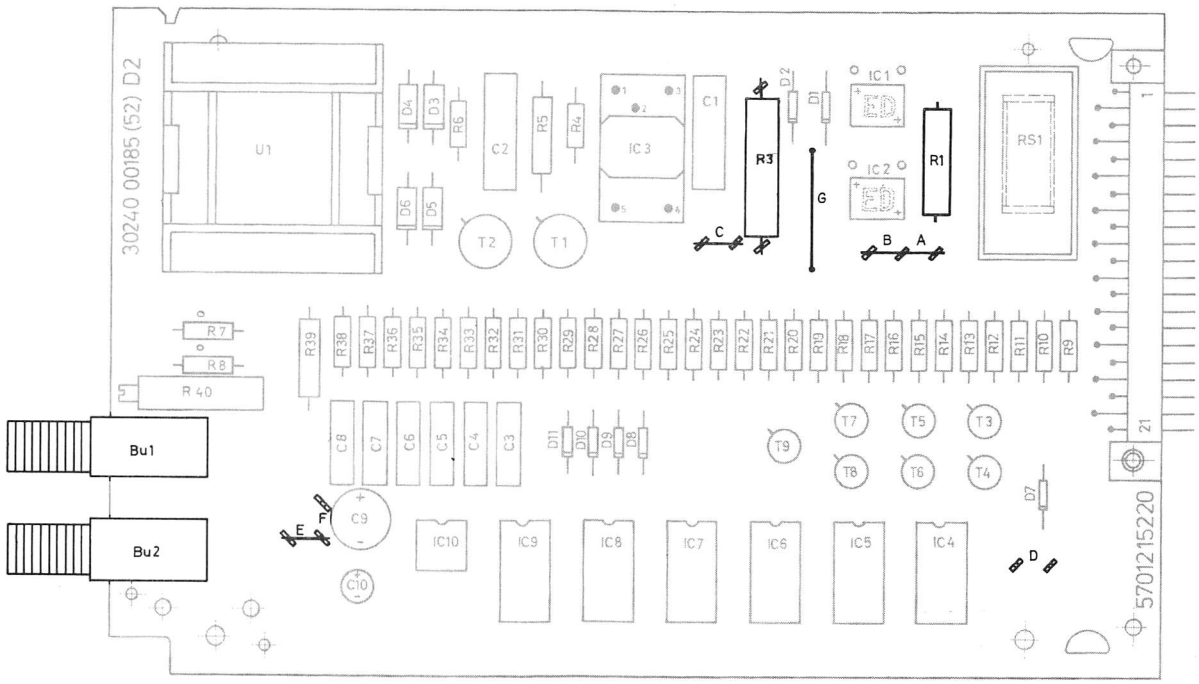
| Strap inserted | Function |
|---|---|
| A | changing to 3rd shift by 4 times S |
| B | changing to 3rd shift by 32nd combination |
| C | always inserted |

Switch S1

Switch S1 is used for setting up the telegraph speeds indicated below.

| Switch Position | | | | Telegraph Speed in Bauds | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | Local Operation | Telegraph Operation |
| × | | × | | 100 | 50 |
| × | | | × | 100 | 75 |
| | × | — | — | 100 | 100 |

## LP 12 Line Adaptation 57012 15221 A 01




Bu 1: Interruption female connectors for measuring the transmit data D 1
Bu 2: Interruption female connectors for measuring the receive data D 2

Straps:

| Version (Order No.) | | Straps | | | | | | | R3 | R1 |
|---|---|---|---|---|---|---|---|---|---|---|
| LP 12 with casing | LP 12 w/o casing | A | B | C | D | E | F | G | | |
| 57012 15221 | 57012 15220 | × | × | × | | × | | always inserted | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 15329 | 57012 15220 | × | × | | | × | | | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 50321 | 57012 15220 | × | × | × | | | × | | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 50323 | 57012 15220 | × | × | × | × | × | | | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 50327 | 57012 15220 | × | × | × | × | | × | | 56 kohms/0.5 W | 62 ohms/0.33 W |
| 57012 15323 | 57012 15228 | × | × | × | × | × | | | 20 kohms/1 W | 62 ohms/0.33 W |
| 57012 15328 | 57012 15228 | × | × | | | × | | | 20 kohms/1 W | 62 ohms/0.33 W |
| 57012 50328 | 57012 15228 | × | × | × | × | × | | | 20 kohms/1 W | 33 ohms/0.33 W |

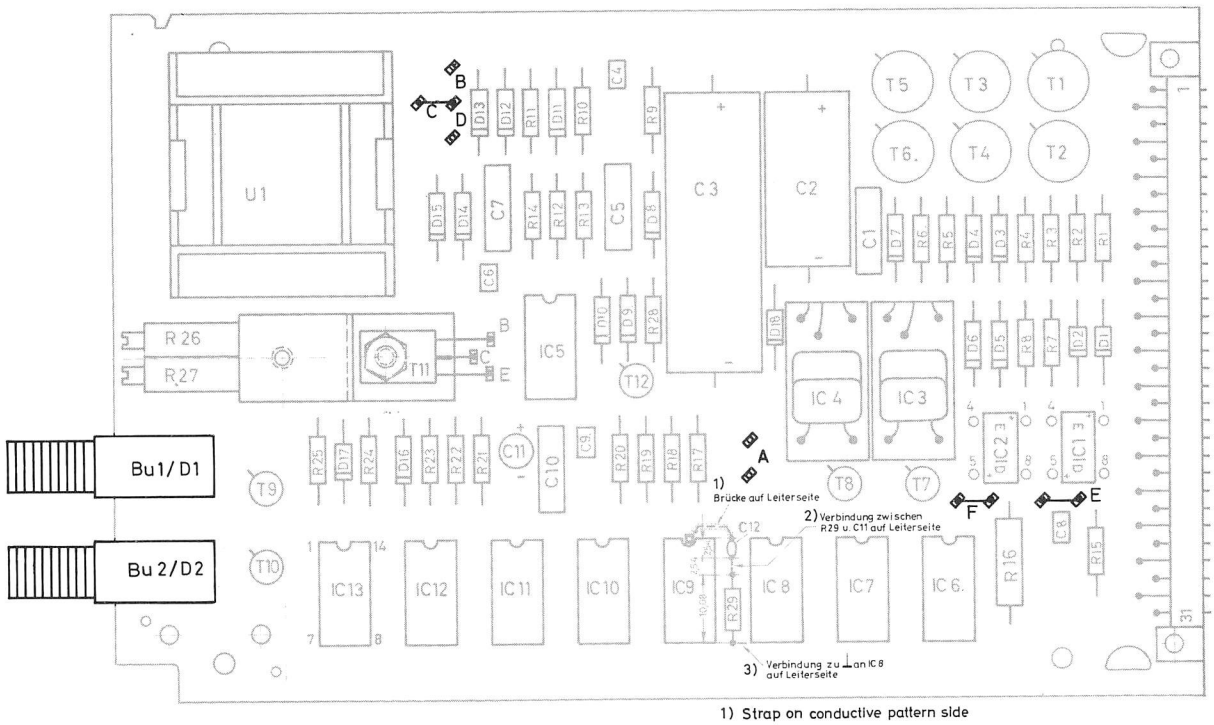
| Strap | Mode of Operation |
|---|---|
| A, B | inserted: if IC 1 and IC 2 ≙ H 15 B 1 (or SOC 307); not inserted: if IC 1 and IC 2 ≙ 5082-4370 |
| C | inserted: static current ≠ 0; not inserted: static current = 0 |
| D | inserted: line monitoring on; not inserted: line monitoring off |
| E | inserted: D 2 on line polarity dependent; not inserted: than strap F |
| F | inserted: D 2 on line polarity independent; not inserted: than strap E |

| Values of Resistors | | Order No. | Function |
|---|---|---|---|
| R1 | 33/0.33 W | 41132 42330 | operating current 60 mA |
| | 62/0.33 W | 41132 42620 | operating current 40 mA |
| R3 | 20 k/1 W | 41145 25200 | static current 5 mA |
| | 56 k/0.5 W | 41145 25560 | static current 2 mA |

DC 4W



**LP 12 Line Adaptation 57012 15325 A01**




1) Strap on conductive pattern side
2) Connection between R29 and C11 on conductive pattern side
3) Connection to ⊥ at IC 8 on conductive pattern side

Bu 1: Interruption female connectors for measuring the transmit data D1
Bu 2: Interruption female connectors for measuring the receive data D2

Straps:

| Version (Order No.) | | Straps | | | | | |
|---|---|---|---|---|---|---|---|
| LP12 with housing | LP12 w/o housing | A | B | C | D | E | F |
| 57012 15325[1]) | 57012 15225 | | | × | | × | × |
| 57012 15327 | 57012 15225 | | | | × | × | × |
| 57012 50320[2]) | 57012 15225 | | | × | | × | × |

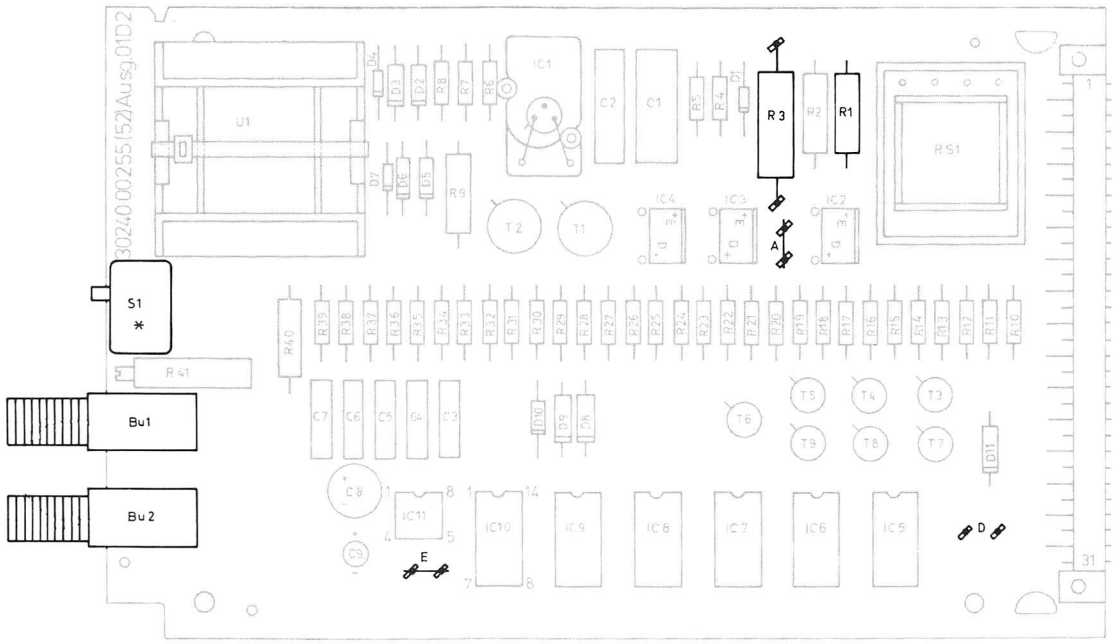
[1]) Adjusting of voltage at R26 and R27 upon 60 V
[2]) Adjusting of voltage at R26 and R27 upon 48 V

| Strap | Mode of Operation |
|---|---|
| A | inserted: Line monitoring ON<br>not inserted: Line monitoring OFF |
| B | inserted: Open-circuit voltage < 30 V |
| C | inserted: Open-circuit voltage 48 and 60 V |
| D | inserted: Open-circuit voltage 80 V |
| E, F | inserted: if IC 1 = IC 2 ≙ H15 B1 (SOC 307)<br>not inserted: if IC 1 = IC 2 ≙ 5082-4370 |

SC 4W



**LP 12 Line Adaptation 57012 15326 A 02**




* S1 Nur in Ausführung 57012 50226 bestückt
Only in version 57012 50226 equipped

Bu 1: Interruption female connectors for measuring the transmit data D1
Bu 2: Interruption female connectors for measuring the receive data D2

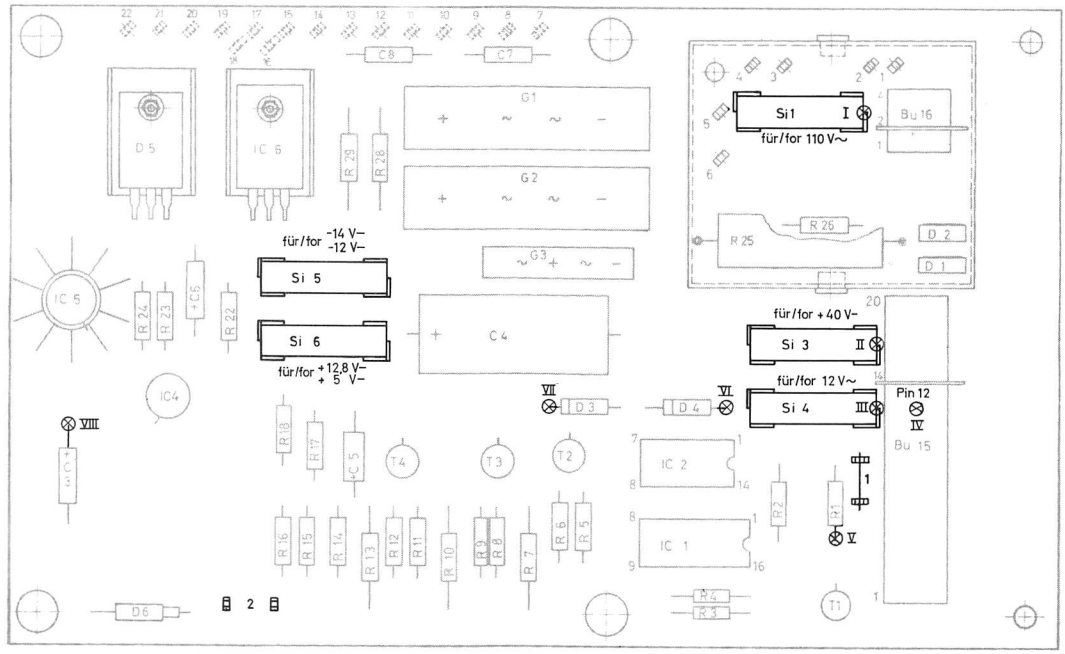
Straps:

| Version Order No. | Straps | | | Switch S1 equipped[1]) |
|---|---|---|---|---|
| | A | D | E | |
| 57012 15326 | × | | × | |
| 57012 50326 | × | | × | × |
| 57012 51323 | × | × | × | |
| 57012 51326 | × | | | |
| 57012 51327 | × | × | | |

[1]) Switch S1 (Order No. 48312 21023) is used for switching from high-level to low-level usings

| Strap | Function | |
|---|---|---|
| | Strap inserted | Strap not inserted |
| A | Static current ≠ 0 | Static current = 0 |
| D | Line monitoring ON | Line monitoring OFF |
| E | D2 dependent on line polarity | D2 independent of line polarity |

## LP 15 Power Supply Unit 57012 15250 A 01



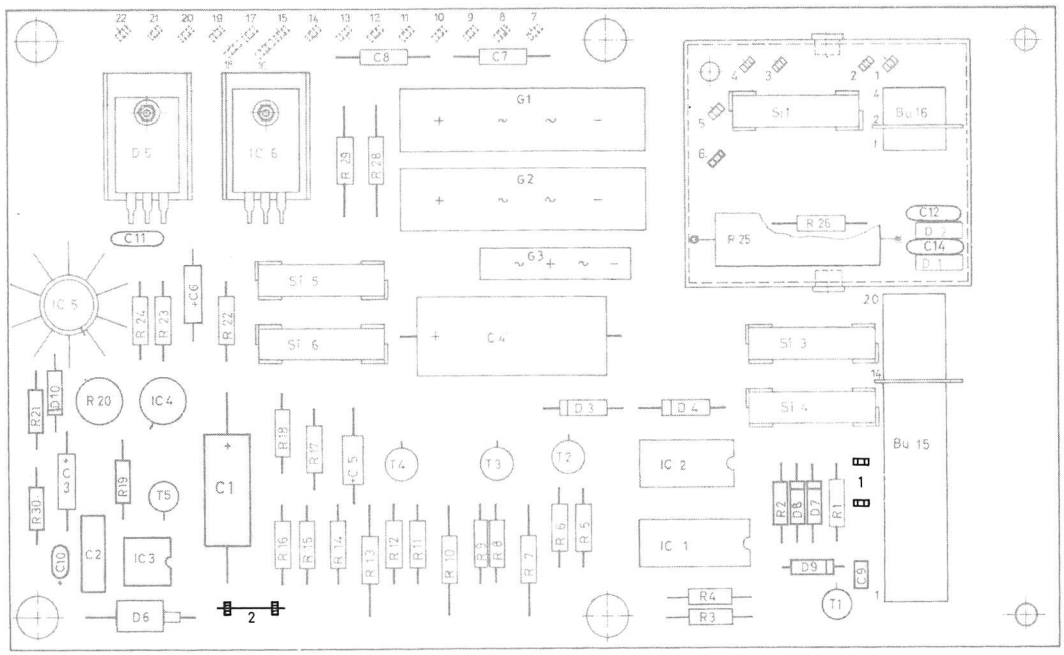

Measurements:

| Measuring Point | | Voltage |
|---|---|---|
| I | Si 1 | 110 V ~ |
| II | Si 3 | + 40 V — |
| III | Si 4 | 12 V ~ |
| IV | Bu 15/12 | + 5 V — |
| V | R 1 | 0 V |
| VI | D 4 | —12 V — |
| VII | D 3 | —14 V — |
| VIII | C 3 | + 12.8 V — |

Straps:

The PCB 15, Power Supply Unit, 57012 15250 is built up without motor switch. For this reason strap 1 must be inserted.

## LP 15 Power Supply Unit 57012 15253 A 01

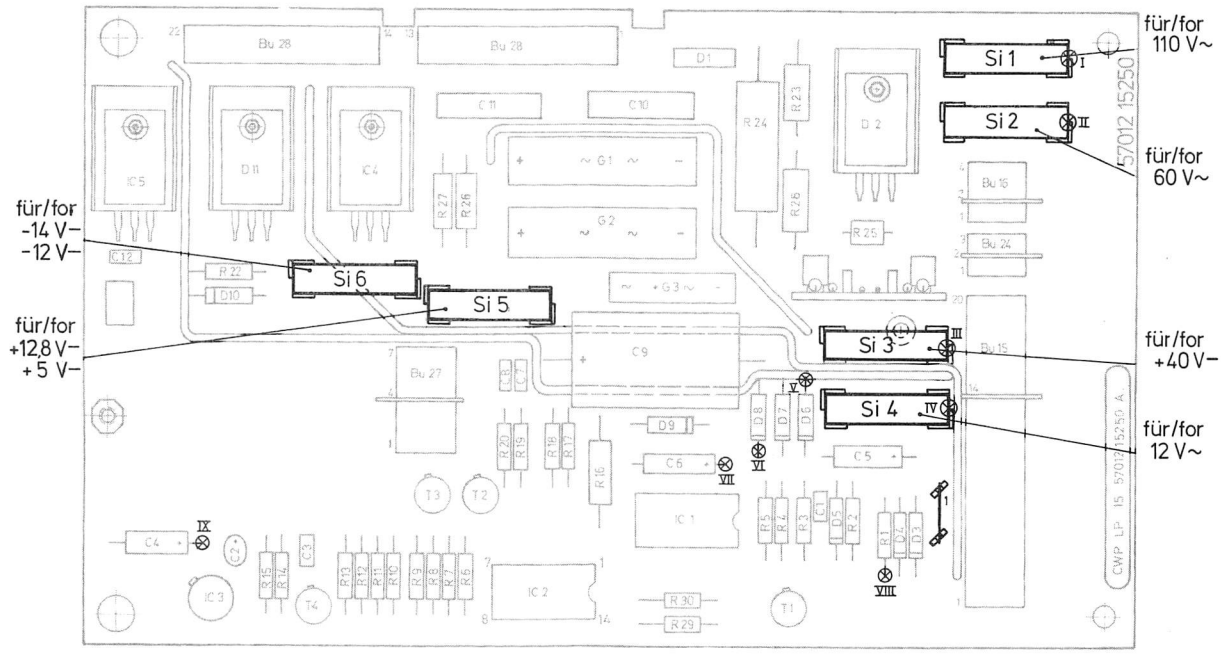



Measurements:
the same as for Power Supply Unit 57012 15250

Straps:

| Version (Order No.) | Mode of Operation | Straps | |
|---|---|---|---|
| | | 1 | 2 |
| 57012 15253 | Motor switch active | | × |
| 57012 50253 | Motor switch not active | × | |

**LP 15 Power Supply Unit 57012 51250 A 02**



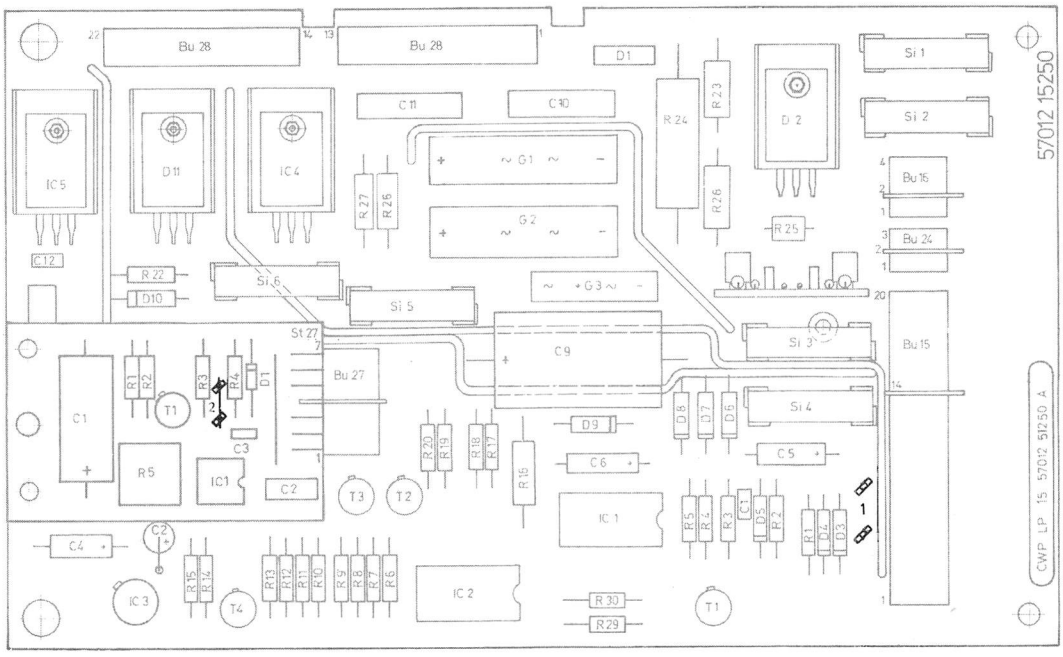

Measurements:

| Measuring Point | | Voltage |
|---|---|---|
| I | Si 1 | 110 V ~ |
| II | Si 2 | 60 V ~ |
| III | Si 3 | + 40 V — |
| IV | Si 4 | 12 V ~ |
| V | D6 | —12 V — |
| VI | D8 | —14 V — |
| VII | C6 | + 5 V — |
| VIII | R1 | 0 V |
| IX | C4 | + 12.8 V — |

Straps:

The PCB 15, Power Supply Unit, 57012 51250 is built up without motor switch. For this reason strap 1 must be inserted.

## LP 15 Power Supply Unit 57012 51253 A02




Measurements:
the same as for Power Supply Unit 57012 51250

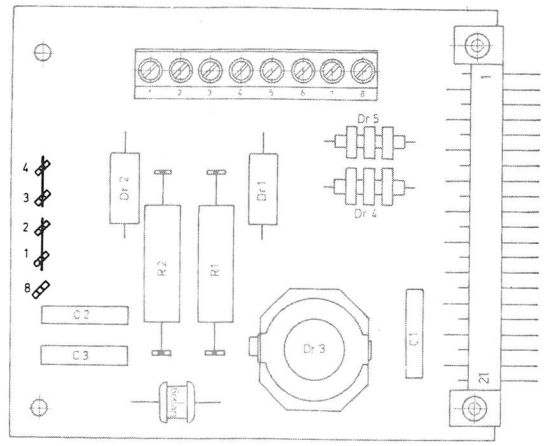
Straps:

The motor switch is built up upon a separate printed circuit board (LP 22 57012 15320). It is plugged-in in socket Bu 27 on Power Supply version 57012 51253.

| Version (Order No.) | Mode of Operation | Straps[1] | | Built-up of |
|---|---|---|---|---|
| | | 1 | 2 | |
| 57012 51253 | Motor switch active | | × | 57012 51250 + 57012 15320 |
| 57012 52253 | Motor switch not active | × | | 57012 51250 + 57012 15320 |
| 57012 53253 | Motor switch not active on local operation | × | × | 57012 51250 + 57012 15320 |

[1]) Strap 1 is inserted on PCB 15 (LP 15)
Strap 2 is inserted on PCB 22 (LP 22)

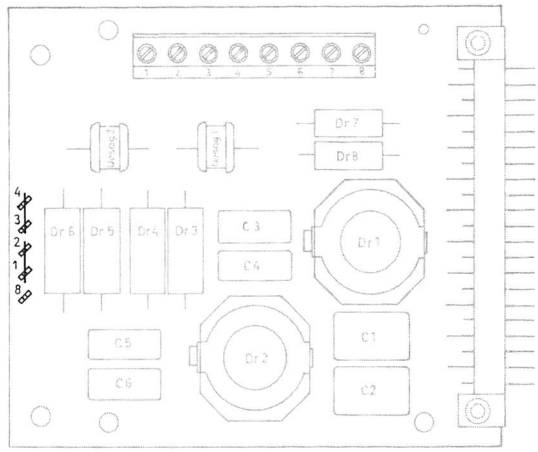
**LP 16 Filter 57012 15260 A 01**
(included in Filter, compl. 57012 16001...5, 7)




Straps:

The data lines D1 (soldering terminals 1-2) and D2 (soldering terminals 3-4) on PCB 15 Filter may become unripped.
It is possible to lead D1 and D2 outwards via an additional telegraph socket which may become mounted on the filter, compl. (external special features with V. 28 level).

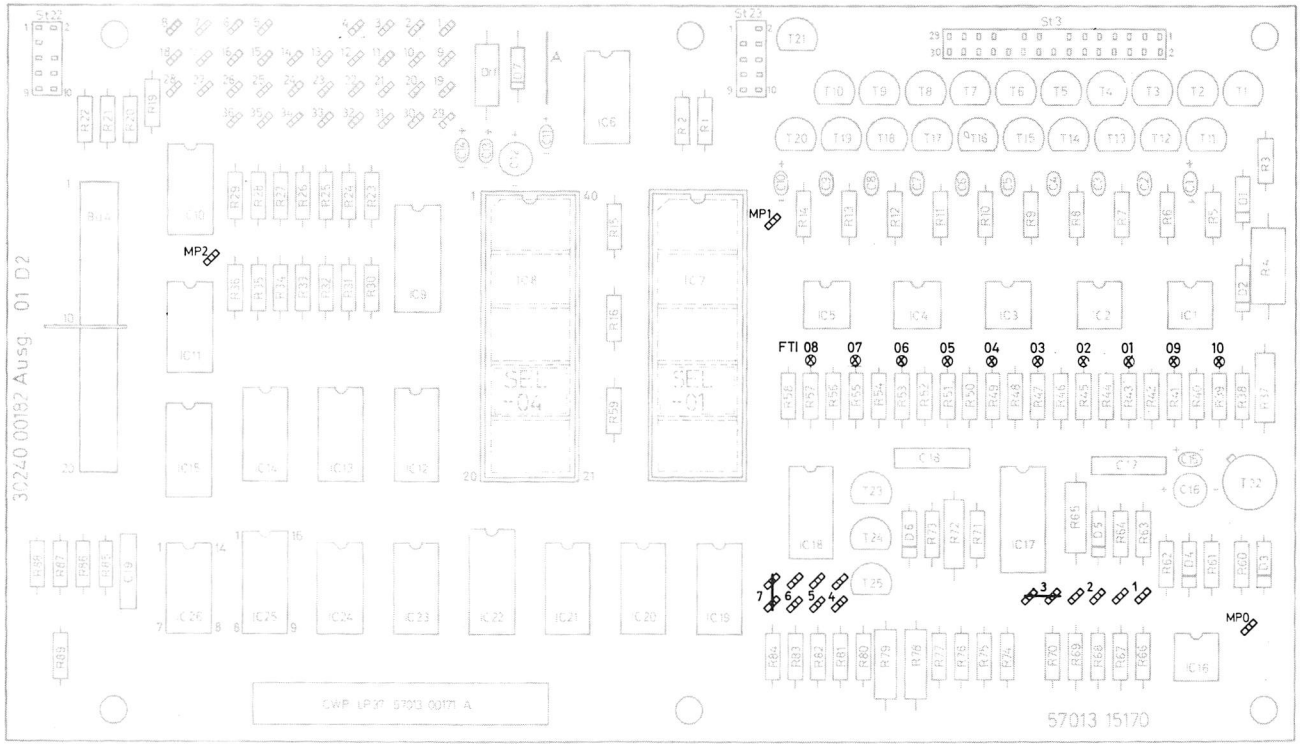
**LP 16 Filter 4 DR E/D**
(included in Filter, compl.
57012 15264 A 01,
57012 16010 and 57012 16012)




Straps:

The data lines D1 (soldering terminals 1-2) and D2 (soldering terminals 3-4) on PCB 15 Filter may become unripped.
It is possible to lead D1 and D2 outwards via an additional telegraph socket which may become mounted on the filter, compl. (external special features with V. 28 level).

**LP 37 Transmitter Control 57013 15171 A 01**
**(with Cable)**




Measuring Points:

MP 0: 0 V
MP 1: Pulse STAE
(start recognition ≙ recognition of a key operation)
MP 2: Start pulse for tape reader ($\overline{STA}$)

The voltage drop over the respective collector resistance of the amplifier stage which is competent for the respective light channel in the keyboard, may be measured on the points FTI 01 to 10. In local operation there must be measurable a voltage drop of $\geq$ 300 mV between the points ⊗ → MP 0 (meter 50 kohms/V).

Straps:

| Version (Order No.) | Straps | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 57013 15170 | | | × | | | | × |
| 57013 15172 | | | × | | × | | × |
| 57013 15178[1]) | | | × | | | | × |
| 57013 51170[2]) | | | × | | | × | |

[1]) Soldering terminals 8 connected with 12 and 14 with 28.
[2]) Lead from soldering terminal 17 unsoldered and isolated.

LP 37 Transmitter Control 57013 15171 A 01
(with Cable)

Mode of operation:

| Straps | | | Answer-back Units 1 and 2 | |
|---|---|---|---|---|
| 1 | 2 | 3 | Internal Release | External Release |
| | | | 1 | |
| | × | | 1 and 2 | |
| | | × | 1 | 1 |
| × | | × | 1 | 1 and 2 |
| × | × | × | 1 and 2 | 1 and 2 |

Strap 3 inserted: $\overline{WD}$ = "0"
Answer-back unit release at reception of "WHO ARE YOU" combination

Strap 2 inserted: TAKG = "1"
Answer-back unit 2 is released subsequently to answer-back unit 1 when answer-back unit 1 key is depressed

Strap 1 and 3 inserted: $\overline{WD}$ = "0"
Answer-back unit 2 is automatically released subsequently to answer-back unit 1

Strap 4 not inserted:
$\overline{SSL\,2}$ = 12 V ≙ 1.5 element stop signal

Strap 4 inserted:
$\overline{SSL\,2}$ = 0 V ≙ 2 element stop signal

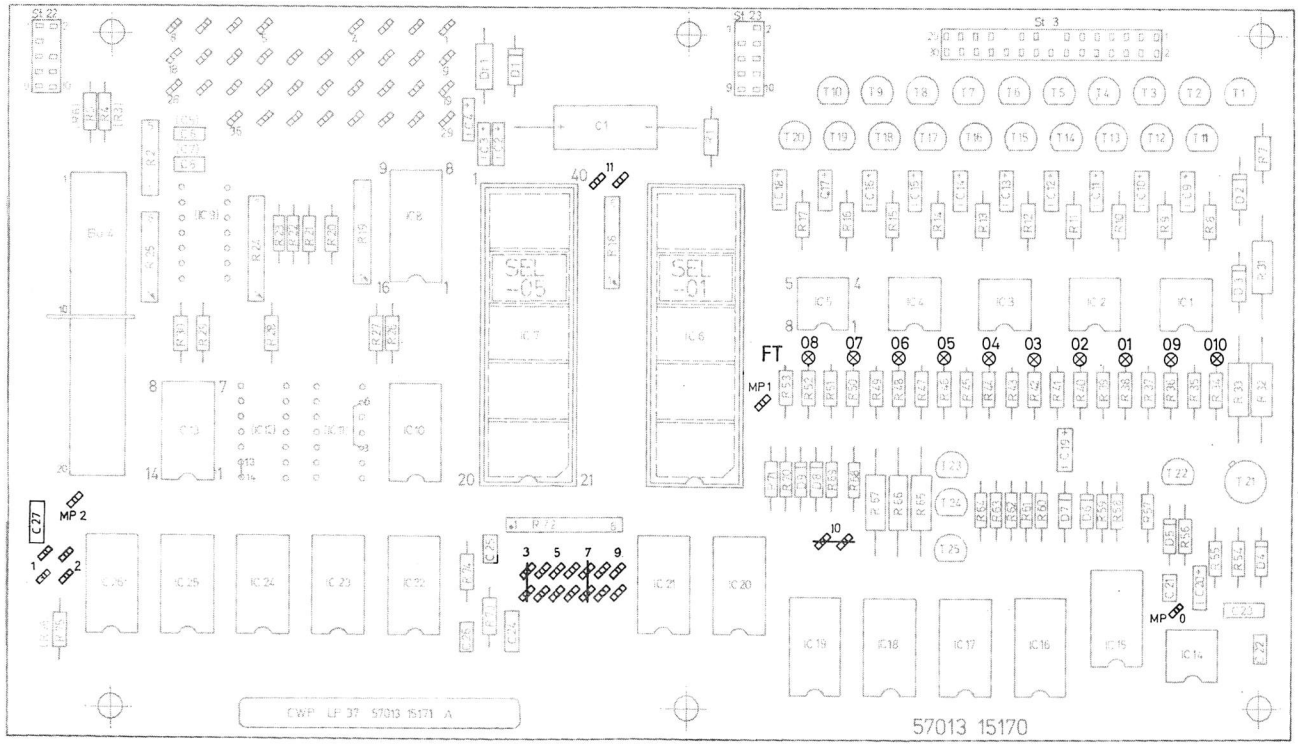
Strap 6 not inserted:
$\overline{SML}$ = 12 V: For keyboards **with** automatic Ltrs/Figs shift

Strap 6 inserted:
$\overline{SML}$ = 0 V: For keyboards **without** automatic Ltrs/Figs shift **and** featuring suppression of the combinations 6, 7, 8 in ZI (Figs) state.

| Straps[3]) | | Signal | |
|---|---|---|---|
| 5 | 7 | Bell | End of Line |
| not inserted | | — | No limitation of line length |
| × | | 62nd char. | 72nd char. |
| | × | 59th char. | 69th char. |
| × | × | 94th char. | 104th char. |

[3]) When changing the line length observe the adjustments 3.2.3., 3.2.6., 3.2.13., 3.2.14., 3.2.15., and 3.2.17.

**LP 37 Transmitter Control 57013 15171 A 02**
**(with Cable)**




Measuring Points:

MP 0: 0 V
MP 1: Pulse STAE
(start recognition ≙ recognition of a key operation)
MP 2: Start pulse for tape reader (STA)

Straps:

| Straps | | | Answer-back Units | |
|---|---|---|---|---|
| 1 | 2 | 3 | Internal Release | External Release |
| | | | 1 | |
| | × | | 1 and 2 | |
| | | × | 1 | 1 |
| × | | × | 1 | 1 and 2 |
| × | × | × | 1 and 2 | 1 and 2 |

Strap 3 inserted: $\overline{WD}$ = "0":
Answer-back unit 1 is released at reception of combination "WHO ARE YOU"

Strap 2 inserted: TAKG 1 = "1":
Answer-back unit 2 is released subsequently to answer-back unit 1 if answer-back unit key 1 is depressed

Strap 1 and 3 inserted: WD = "0":
Answer-back unit 2 is automatically released subsequently to answer-back unit 1

Strap 4 not inserted:
$\overline{SSL\,2}$ ≙ 12 V = 1.5 element stop signal

Strap 4 inserted:
$\overline{SSL\,2}$ ≙ 0 V = 2 element stop signal

The voltage drop over the respective collector resistance of the amplifier stage which is competent for the respective light channel in the keyboard, may be measured on the points FT 01 to 10. In local operation there must be measurable a voltage drop of ≥ 300 mV between the points ⊗ → MP 0 (meter 50 kohms/V).

(Strap 5 and 7 serve for setting the line length)

| Straps | | Signal | |
|---|---|---|---|
| 5 | 7 | Bell | End of Line |
| not inserted | | | No limitation of line length |
| × | | 62nd char. | 72nd char. |
| | × | 59th char. | 69nd char. |
| × | × | 94th char. | 104th char. |

When changing the line length observe the adjustments 3.2.3., 3.2.6., 3.2.13., 3.2.14., 3.2.15., and 3.2.17.

LP37 Transmitter Control 57013 15171 A02
(with Cable)

| Straps 6 | Straps 9 | 6th, 7th, and 8th Combination Figs. State | Ltrs./Figs. Automatic |
|---|---|---|---|
| | | not locked | active |
| | × | not locked | not active |
| × | × | locked | not active |
| × | | not practicable | |

Strap 8 not inserted:
no keyboard lock if double recognition

Strap 8 inserted:
keyboard lock if double recognition

Strap 10 not inserted:
$\overline{BAW} < 2$ s (may only be removed if IC 7 is not identical with SEL-04)

Strap 10 inserted:
$\overline{BAW} \geq 2$ s

Strap 11 not inserted:
IC 7 ≙ SEL-04 or 05

Strap 11 inserted:
IC 7 ≙ SEL-05A

Strap 12 not inserted (from soldering terminal 7 to 35):
break-in recognition ON

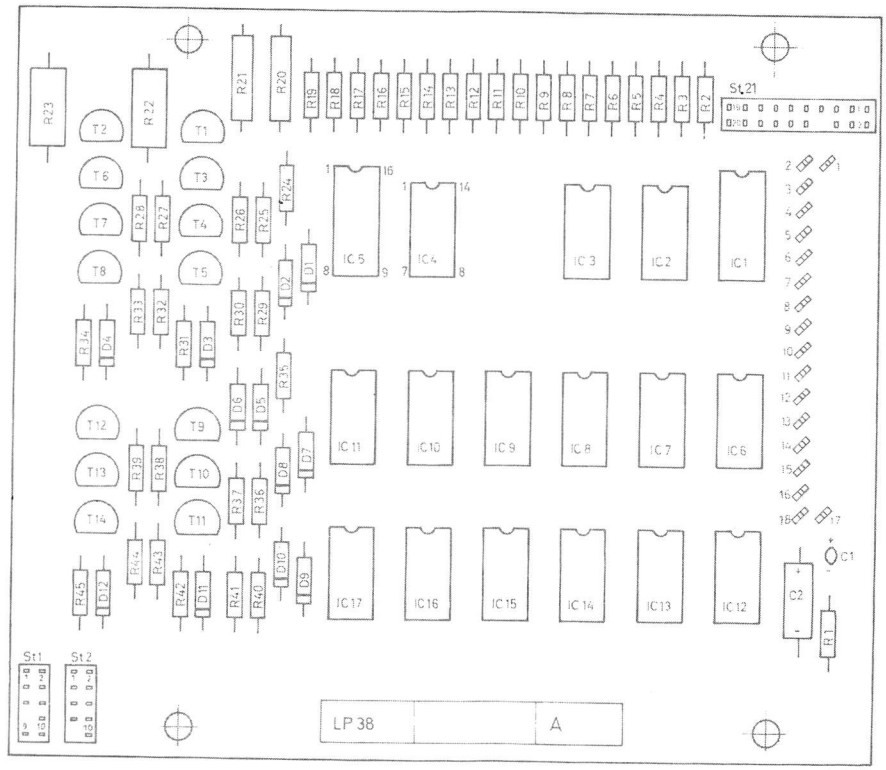
Strap 12 inserted:
break-in recognition switched OFF. Connection ED unripped at terminal 35

| Version Order No. | Straps 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Chip SEL- 05 | 05A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57013 15171 | | | × | | | | × | | | × | | | × | |
| 57013 15272 | | | × | | × | | × | | | × | | | × | |
| 57013 15274 | | | × | | | | × | × | | × | | | × | |
| 57013 15276 | | | × | | | | × | | × | | | × | × | |
| 57013 15278[1]) | | | × | | | | × | | | × | | | × | |
| 57013 15279 | | | | | | | × | | × | × | | | × | |
| 57013 50170 | | | × | | | | × | | | × | | × | × | |
| 57013 50171 | | | × | | | | × | | | × | × | | | × |
| 57013 50172 | | | × | | × | | | | × | × | | | × | |
| 57013 50173 | | | × | | × | | | | | × | | | × | |
| 57013 50174 | | | | | | | × | | | × | | | × | |
| 57013 50175 | | | | | × | | × | | | × | | × | × | |
| 57013 50176 | | | | | | | × | | | × | | × | × | |
| 57013 50178 | | | × | | | | × | | × | × | × | × | | × |
| 57013 50179 | | | × | | | | × | | × | | × | × | | × |
| 57013 51174 | | | × | | × | | × | × | | | | | × | |
| 57013 52171 | | | | | | | × | | × | | | | × | |
| 57013 53171 | | | × | | × | | | | | × | | | × | |
| 57013 53272 | | | × | | × | | | | × | | | | × | |

[1]) Connections from soldering terminals 8—12 and 14—28 inserted

| Connections | Function |
|---|---|
| 8—12 and 14—28 | inserted: indication (LD 12, ON-OFF) by external cut-in and cut-off of reader<br>not inserted: no indication |

**LP 38 Tape Reader Control 57013 15181 A 01**
**(with Cable)**



# 5. ERSATZTEILVERZEICHNIS
# PARTS LIST
# LISTE DES PIECES DETACHEES
# LISTA DE PIEZAS

Bei der Bestellung von Ersatzteilen ist neben der Bestellnummer des Ersatzteils auch die Nummer der Funktionsausgabe (F 0X beziehungsweise A 0X) der Baugruppe mit anzugeben.

On spare part order, please list the number of functional issue (F 0X or A 0X) of the assembly in addition to the spare part number.

| STANDARD ELEKTRIK LORENZ AG | |
|---|---|
| Z | |
| F | 0X |

En cas de commandes de pièces de rechange, il est indispensable d'indiquer le numéro de commande de pièces de rechange et le numéro d'édition de fonction (F 0X respectivement A 0X) du bloc d'assemblage.

Al efectuar un pedido de piezas de recambio es necesario indicar, además del número de pieza de recambio, el número de la edición de función (F 0X o A 0X) del grupo constructivo.

| CWP LP | A 0X |
|---|---|

LP = Leiterplatte
= Printed circuit board
= Plaque de circuit imprimé
= Placa de circuito impreso

70100 27704

| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | SEL-Fernschreiber LO 2000<br>Benennung | SEL-Teleprinter LO 2000<br>Nomenclature | SEL-Téléimprimeur LO 2000<br>Désignation | SEL-Teleimpresor LO 2000<br>Denominación |
|---|---|---|---|---|---|---|
| 1 | 1 | 57012 15327 | LP 12 | LP 12 | LP 12 | LP 12 |
| 2 | 1 | 57012 15150 | LP 5 | LP 5 | LP 5 | LP 5 |
| 3 | 1 | 57012 53167 | LP 6 | LP 6 | LP 6 | LP 6 |
| * 4 | 1 | – | LP 7 | LP 7 | LP 7 | LP 7 |
| 5 | 1 | 57012 15180 | LP 8 | LP 8 | LP 8 | LP 8 |
| 6 | 1 | 57012 50190 | LP 9 | LP 9 | LP 9 | LP 9 |
| * 7 | 1 | – | LP 10 | LP 10 | LP 10 | LP 10 |
| 8 | 1 | 57012 16010 | LP 16 | LP 16 | LP 16 | LP 16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP 15) | Power supply unit, compl. (including LP 15) | Bloc d'alimentation secteur, compl. (inclusive LP 15) | Unidad de alimentación, compl. (inclusive LP 15) |
| 10 | 1 | 57012 53253 | LP 15 | LP 15 | LP 15 | LP 15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP 1 | LP 1 | LP 1 | LP 1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21002 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guía papel |
| 16 | 1 | 57012 03001 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de caracteristicas (sin disco de codificación) |
| 18 | 1 | 57013 06501 | LP 39 | LP 39 | LP 39 | LP 39 |
| 19 | 1 | 57013 06101 | LP 40 | LP 40 | LP 40 | LP 40 |
| 20 | 1 | 57013 07001 | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31001 | Tastatur | Keyboard | Clavier | Teclado |
| 22 | 1 | 57013 15181 | LP 38 | LP 38 | LP 38 | LP 38 |
| 23 | 1 | 57013 15276 | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70100 27727 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 15327 | LP12 | LP12 | LP12 | LP12 |
| * 2 | 1 | – | LP5 | LP5 | LP5 | LP5 |
| 3 | 1 | 57012 53167 | LP6 | LP6 | LP6 | LP6 |
| * 4 | 1 | – | LP7 | LP7 | LP7 | LP7 |
| 5 | 1 | 57012 15180 | LP8 | LP8 | LP8 | LP8 |
| 6 | 1 | 57012 50190 | LP9 | LP9 | LP9 | LP9 |
| * 7 | 1 | – | LP10 | LP10 | LP10 | LP10 |
| 8 | 1 | 57012 16010 | LP16 | LP16 | LP16 | LP16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP15) | Power supply unit, compl. (including LP15) | Bloc d'alimentation secteur, compl. (inclusive LP15) | Unidad de alimentación, compl. (inclusive LP15) |
| 10 | 1 | 57012 53253 | LP15 | LP15 | LP15 | LP15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| *12 | 1 | – | LP1 | LP1 | LP1 | LP1 |
| *13 | 1 | – | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21002 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guia papel |
| 16 | 1 | 57012 03001 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de características (sin disco de codificación) |
| *18 | 1 | – | LP 39 | LP 39 | LP 39 | LP 39 |
| 19 | 1 | 57013 06101 | LP 40 | LP 40 | LP 40 | LP 40 |
| *20 | 1 | – | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31001 | Tastatur | Keyboard | Clavier | Teclado |
| *22 | 1 | – | LP 38 | LP 38 | LP 38 | LP 38 |
| 23 | 1 | 57013 15276 | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70100 27904 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 15327 | LP 12 | LP 12 | LP 12 | LP 12 |
| 2 | 1 | 57012 15152 | LP 5 | LP 5 | LP 5 | LP 5 |
| 3 | 1 | 57012 53167 | LP 6 | LP 6 | LP 6 | LP 6 |
| * 4 | 1 | - | LP 7 | LP 7 | LP 7 | LP 7 |
| 5 | 1 | 57012 15180 | LP 8 | LP 8 | LP 8 | LP 8 |
| 6 | 1 | 57012 50195 | LP 9 | LP 9 | LP 9 | LP 9 |
| 7 | 1 | 57012 15202 | LP 10 | LP 10 | LP 10 | LP 10 |
| 8 | 1 | 57012 16010 | LP 16 | LP 16 | LP 16 | LP 16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP 15) | Power supply unit, compl. (including LP 15) | Bloc d'alimentation secteur, compl. (inclusive LP 15) | Unidad de alimentación, compl. (inclusive LP 15) |
| 10 | 1 | 57012 53253 | LP 15 | LP 15 | LP 15 | LP 15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP 1 | LP 1 | LP 1 | LP 1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21201 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guia papel |
| 16 | 1 | 57012 03002 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de caracteristicas (sin disco de codificación) |
| 18 | 1 | 57013 06501 | LP 39 | LP 39 | LP 39 | LP 39 |
| 19 | 1 | 57013 06101 | LP 40 | LP 40 | LP 40 | LP 40 |
| 20 | 1 | 57013 07001 | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31003 | Tastatur | Keyboard | Clavier | Teclado |
| 22 | 1 | 57013 15181 | LP 38 | LP 38 | LP 38 | LP 38 |
| 23 | 1 | 57013 50179 | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70100 47604 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 15327 | LP 12 | LP 12 | LP 12 | LP 12 |
| 2 | 1 | 57012 15150 | LP 5 | LP 5 | LP 5 | LP 5 |
| 3 | 1 | 57012 53167 | LP 6 | LP 6 | LP 6 | LP 6 |
| * 4 | 1 | – | LP 7 | LP 7 | LP 7 | LP 7 |
| 5 | 1 | 57012 15180 | LP 8 | LP 8 | LP 8 | LP 8 |
| 6 | 1 | 57012 50190 | LP 9 | LP 9 | LP 9 | LP 9 |
| 7 | 1 | – | LP 10 | LP 10 | LP 10 | LP 10 |
| 8 | 1 | 57012 16010 | LP 16 | LP 16 | LP 16 | LP 16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP 15) | Power supply unit, compl. (including LP 15) | Bloc d'alimentation secteur, compl. (inclusive LP 15) | Unidad de alimentación, compl. (inclusive LP 15) |
| 10 | 1 | 57012 53253 | LP 15 | LP 15 | LP 15 | LP 15 |
| 11 | 1 | 38150 40177 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP 1 | LP 1 | LP 1 | LP 1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21002 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guia papel |
| 16 | 1 | 57012 03001 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de caracteristicas (sin disco de codificación) |
| 18 | 1 | 57013 06501 | LP 39 | LP 39 | LP 39 | LP 39 |
| 19 | 1 | 57013 06101 | LP 40 | LP 40 | LP 40 | LP 40 |
| 20 | 1 | 57013 07001 | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31001 | Tastatur | Keyboard | Clavier | Teclado |
| 22 | 1 | 57013 15181 | LP 38 | LP 38 | LP 38 | LP 38 |
| 23 | 1 | 57013 15276 | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70100 47804 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 15327 | LP12 | LP12 | LP12 | LP12 |
| 2 | 1 | 57012 15152 | LP5 | LP5 | LP5 | LP5 |
| 3 | 1 | 57012 53167 | LP6 | LP6 | LP6 | LP6 |
| * 4 | 1 | – | LP7 | LP7 | LP7 | LP7 |
| 5 | 1 | 57012 15180 | LP8 | LP8 | LP8 | LP8 |
| 6 | 1 | 57012 50195 | LP9 | LP9 | LP9 | LP9 |
| 7 | 1 | 57012 15202 | LP10 | LP10 | LP10 | LP10 |
| 8 | 1 | 57012 16010 | LP16 | LP16 | LP16 | LP16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP15) | Power supply unit, compl. (including LP15) | Bloc d'alimentation secteur, compl. (inclusive LP15) | Unidad de alimentación, compl. (inclusive LP15) |
| 10 | 1 | 57012 53253 | LP15 | LP15 | LP15 | LP15 |
| 11 | 1 | 38150 40177 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP1 | LP1 | LP1 | LP1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21201 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guia papel |
| 16 | 1 | 57012 03002 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de características (sin disco de codificación) |
| 18 | 1 | 57013 06501 | LP 39 | LP 39 | LP 39 | LP 39 |
| 19 | 1 | 57013 06101 | LP 40 | LP 40 | LP 40 | LP 40 |
| 20 | 1 | 57013 07001 | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31003 | Tastatur | Keyboard | Clavier | Teclado |
| 22 | 1 | 57013 15181 | LP 38 | LP 38 | LP 38 | LP 38 |
| 23 | 1 | 57013 50179 | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70100 27504 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 50224 | LP12 | LP12 | LP12 | LP12 |
| 2 | 1 | 57012 15152 | LP5 | LP5 | LP5 | LP5 |
| 3 | 1 | 57012 53167 | LP6 | LP6 | LP6 | LP6 |
| * 4 | 1 | – | LP7 | LP7 | LP7 | LP7 |
| 5 | 1 | 57012 15180 | LP8 | LP8 | LP8 | LP8 |
| 6 | 1 | 57012 50195 | LP9 | LP9 | LP9 | LP9 |
| 7 | 1 | 57012 15202 | LP10 | LP10 | LP10 | LP10 |
| 8 | 1 | 57012 16102 | LP16 | LP16 | LP16 | LP16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP15) | Power supply unit, compl. (including LP15) | Bloc d'alimentation secteur, compl. (inclusive LP15) | Unidad de alimentación, compl. (inclusive LP15) |
| 10 | 1 | 57012 53253 | LP15 | LP15 | LP15 | LP15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP1 | LP1 | LP1 | LP1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21201 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guia papel |
| 16 | 1 | 57012 03002 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de caracteristicas (sin disco de codificación) |
| 18 | 1 | 57013 06501 | LP39 | LP39 | LP39 | LP39 |
| 19 | 1 | 57013 06101 | LP40 | LP40 | LP40 | LP40 |
| 20 | 1 | 57013 07001 | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31003 | Tastatur | Keyboard | Clavier | Teclado |
| 22 | 1 | 57013 15181 | LP38 | LP38 | LP38 | LP38 |
| 23 | 1 | 57013 50179 | LP37 | LP37 | LP37 | LP37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70100 27527 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 50224 | LP 12 | LP 12 | LP 12 | LP 12 |
| * 2 | 1 | – | LP 5 | LP 5 | LP 5 | LP 5 |
| 3 | 1 | 57012 53167 | LP 6 | LP 6 | LP 6 | LP 6 |
| * 4 | 1 | – | LP 7 | LP 7 | LP 7 | LP 7 |
| 5 | 1 | 57012 15180 | LP 8 | LP 8 | LP 8 | LP 8 |
| 6 | 1 | 57012 50195 | LP 9 | LP 9 | LP 9 | LP 9 |
| 7 | 1 | 57012 15202 | LP 10 | LP 10 | LP 10 | LP 10 |
| 8 | 1 | 57012 16102 | LP 16 | LP 16 | LP 16 | LP 16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP 15) | Power supply unit, compl. (including LP 15) | Bloc d'alimentation secteur, compl. (inclusive LP 15) | Unidad de alimentación, compl. (inclusive LP 15) |
| 10 | 1 | 57012 53253 | LP 15 | LP 15 | LP 15 | LP 15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| *12 | 1 | – | LP 1 | LP 1 | LP 1 | LP 1 |
| *13 | 1 | – | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21201 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guía papel |
| 16 | 1 | 57012 03002 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de características (sin disco de codificación) |
| * 18 | 1 | – | LP 39 | LP 39 | LP 39 | LP 39 |
| 19 | 1 | 57013 06101 | LP 40 | LP 40 | LP 40 | LP 40 |
| * 20 | 1 | – | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31003 | Tastatur | Keyboard | Clavier | Teclado |
| * 22 | 1 | – | LP 38 | LP 38 | LP 38 | LP 38 |
| 23 | 1 | 57013 50179 | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung
The items marked with an asterisk are omitted in this teleprinter version
L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur
Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70100 28427 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 50224 | LP12 | LP12 | LP12 | LP12 |
| *2 | 1 | – | LP5 | LP5 | LP5 | LP5 |
| 3 | 1 | 57012 53167 | LP6 | LP6 | LP6 | LP6 |
| *4 | 1 | – | LP7 | LP7 | LP7 | LP7 |
| 5 | 1 | 57012 15180 | LP8 | LP8 | LP8 | LP8 |
| 6 | 1 | 57012 15190 | LP9 | LP9 | LP9 | LP9 |
| *7 | 1 | – | LP10 | LP10 | LP10 | LP10 |
| 8 | 1 | 57012 16102 | LP16 | LP16 | LP16 | LP16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP15) | Power supply unit, compl. (including LP15) | Bloc d'alimentation secteur, compl. (inclusive LP15) | Unidad de alimentación, compl. (inclusive LP15) |
| 10 | 1 | 57012 53253 | LP15 | LP15 | LP15 | LP15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| *12 | 1 | – | LP1 | LP1 | LP1 | LP1 |
| *13 | 1 | – | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21002 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guia papel |
| 16 | 1 | 57012 03001 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de características (sin disco de codificación) |
| *18 | 1 | – | LP39 | LP39 | LP39 | LP39 |
| 19 | 1 | 57013 06101 | LP40 | LP40 | LP40 | LP40 |
| *20 | 1 | – | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31001 | Tastatur | Keyboard | Clavier | Teclado |
| *22 | 1 | – | LP38 | LP38 | LP38 | LP38 |
| 23 | 1 | 57013 15276 | LP37 | LP37 | LP37 | LP37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70102 20703 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 50224 | LP12 | LP12 | LP12 | LP12 |
| 2 | 1 | 57012 15150 | LP5 | LP5 | LP5 | LP5 |
| 3 | 1 | 57012 50168 | LP6 | LP6 | LP6 | LP6 |
| 4 | 1 | 57012 15172 | LP7 | LP7 | LP7 | LP7 |
| 5 | 1 | 57012 53180 | LP8 | LP8 | LP8 | LP8 |
| 6 | 1 | 57012 50190 | LP9 | LP9 | LP9 | LP9 |
| * 7 | 1 | – | LP10 | LP10 | LP10 | LP10 |
| 8 | 1 | 57012 16102 | LP16 | LP16 | LP16 | LP16 |
| 9 | 1 | 57012 10002 | Netzteil, vollst. (einschließlich LP15) | Power supply unit, compl. (including LP15) | Bloc d'alimentation secteur, compl. (inclusive LP15) | Unidad de alimentación, compl. (inclusive LP15) |
| 10 | 1 | 57012 51250 | LP15 | LP15 | LP15 | LP15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP1 | LP1 | LP1 | LP1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21012 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02005 | Papierführung | Paper guide | Guide du papier | Guía papel |
| 16 | 1 | 57012 03001 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engrenaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de características (sin disco de codificación) |
| 18 | 1 | 57013 06501 | LP39 | LP39 | LP39 | LP39 |
| 19 | 1 | 57013 06101 | LP40 | LP40 | LP40 | LP40 |
| 20 | 1 | 57013 07001 | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 01007 | Tastatur | Keyboard | Clavier | Teclado |
| 22 | 1 | 57013 15181 | LP38 | LP38 | LP38 | LP38 |
| 23 | 1 | 57013 50173 | LP37 | LP37 | LP37 | LP37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70125 24147 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 50224 | LP 12 | LP 12 | LP 12 | LP 12 |
| 2 | 1 | 57012 15150 | LP 5 | LP 5 | LP 5 | LP 5 |
| 3 | 1 | 57012 53167 | LP 6 | LP 6 | LP 6 | LP 6 |
| *4 | 1 | – | LP 7 | LP 7 | LP 7 | LP 7 |
| 5 | 1 | 57012 15180 | LP 8 | LP 8 | LP 8 | LP 8 |
| 6 | 1 | 57012 15190 | LP 9 | LP 9 | LP 9 | LP 9 |
| *7 | 1 | – | LP 10 | LP 10 | LP 10 | LP 10 |
| 8 | 1 | 57012 16102 | LP 16 | LP 16 | LP 16 | LP 16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP 15) | Power supply unit, compl. (including LP 15) | Bloc d'alimentation secteur, compl. (inclusive LP 15) | Unidad de alimentación, compl. (inclusive LP 15) |
| 10 | 1 | 57012 53253 | LP 15 | LP 15 | LP 15 | LP 15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP 1 | LP 1 | LP 1 | LP 1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21002 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guía papel |
| 16 | 1 | 57012 03001 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engranaje de avance |
| *17 | 1 | – | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de características (sin disco de codificación) |
| *18 | 1 | – | LP 39 | LP 39 | LP 39 | LP 39 |
| *19 | 1 | – | LP 40 | LP 40 | LP 40 | LP 40 |
| *20 | 1 | – | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| *21 | 1 | – | Tastatur | Keyboard | Clavier | Teclado |
| *22 | 1 | – | LP 38 | LP 38 | LP 38 | LP 38 |
| *23 | 1 | – | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung
The items marked with an asterisk are omitted in this teleprinter version
L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur
Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

| | | 70100 28404 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 50224 | LP12 | LP12 | LP12 | LP12 |
| 2 | 1 | 57012 15150 | LP5 | LP5 | LP5 | LP5 |
| 3 | 1 | 57012 53167 | LP6 | LP6 | LP6 | LP6 |
| *4 | 1 | – | LP7 | LP7 | LP7 | LP7 |
| 5 | 1 | 57012 15180 | LP8 | LP8 | LP8 | LP8 |
| 6 | 1 | 57012 50190 | LP9 | LP9 | LP9 | LP9 |
| *7 | 1 | – | LP10 | LP10 | LP10 | LP10 |
| 8 | 1 | 57012 16102 | LP16 | LP16 | LP16 | LP16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP15) | Power supply unit, compl. (including LP15) | Bloc d'alimentation secteur, compl. (inclusive LP15) | Unidad de alimentación, compl. (inclusive LP15) |
| 10 | 1 | 57012 53253 | LP15 | LP15 | LP15 | LP15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP1 | LP1 | LP1 | LP1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21002 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guía papel |
| 16 | 1 | 57012 03001 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engranaje de avance |
| 17 | 1 | 38150 40186 | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de características (sin disco de codificación) |
| 18 | 1 | 57013 06501 | LP 39 | LP 39 | LP 39 | LP 39 |
| 19 | 1 | 57013 06101 | LP 40 | LP 40 | LP 40 | LP 40 |
| 20 | 1 | 57013 07001 | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| 21 | 1 | 57013 31001 | Tastatur | Keyboard | Clavier | Teclado |
| 22 | 1 | 57013 15181 | LP 38 | LP 38 | LP 38 | LP 38 |
| 23 | 1 | 57013 15276 | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor

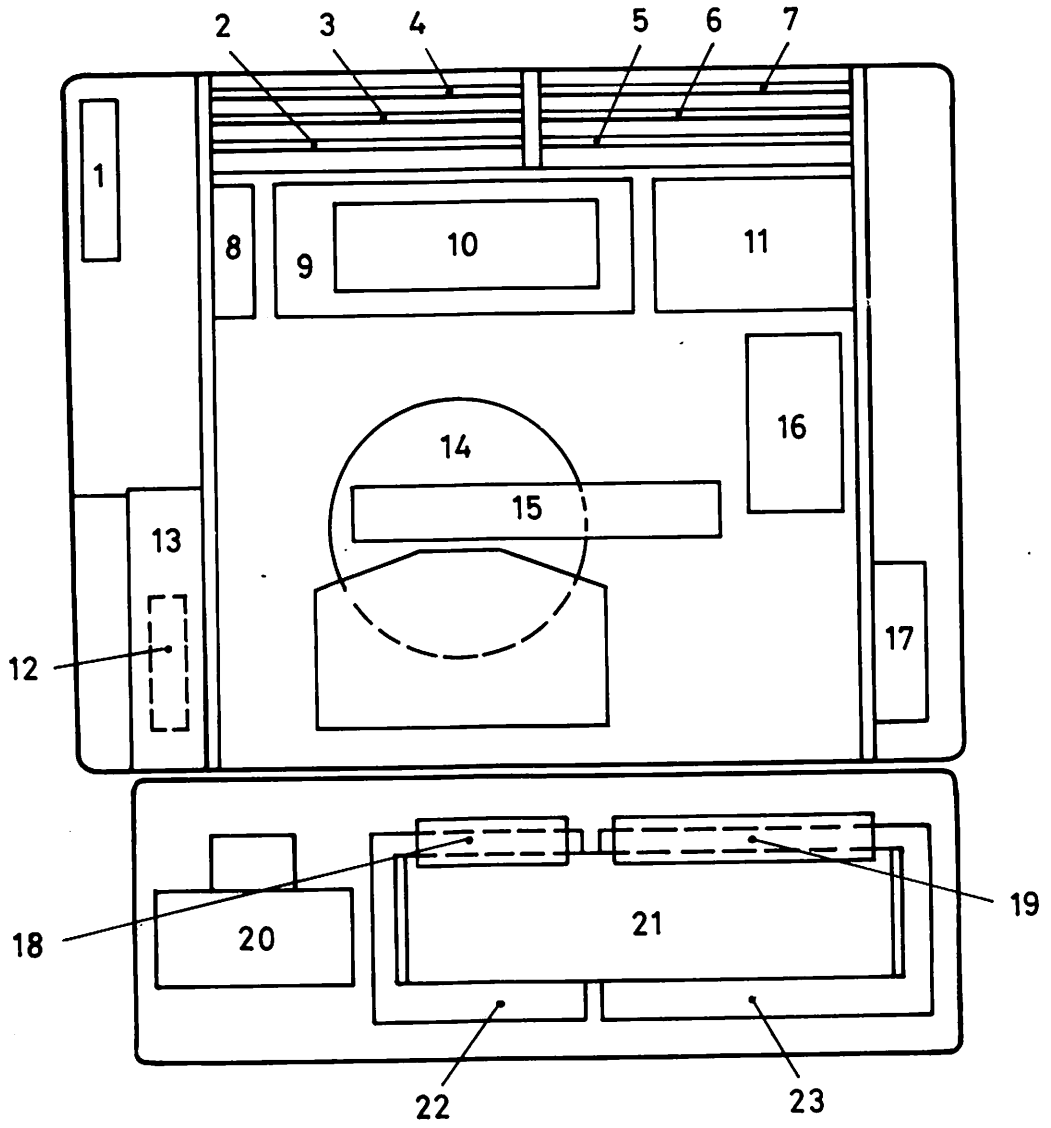
| | | 70125 28147 | SEL-Fernschreiber LO 2000 | SEL-Teleprinter LO 2000 | SEL-Téléimprimeur LO 2000 | SEL-Teleimpresor LO 2000 |
|---|---|---|---|---|---|---|
| Nr.<br>No.<br>No.<br>No. | Stck.<br>Qty.<br>Qté.<br>Cant. | Bestell-Nr.<br>Order No.<br>No. de commande<br>No. de pedido | Benennung | Nomenclature | Désignation | Denominación |
| 1 | 1 | 57012 50224 | LP12 | LP12 | LP12 | LP12 |
| 2 | 1 | 57012 15150 | LP5 | LP5 | LP5 | LP5 |
| 3 | 1 | 57012 53167 | LP6 | LP6 | LP6 | LP6 |
| *4 | 1 | – | LP7 | LP7 | LP7 | LP7 |
| 5 | 1 | 57012 15180 | LP8 | LP8 | LP8 | LP8 |
| 6 | 1 | 57012 15197 | LP9 | LP9 | LP9 | LP9 |
| * 7 | 1 | – | LP10 | LP10 | LP10 | LP10 |
| 8 | 1 | 57012 16102 | LP16 | LP16 | LP16 | LP16 |
| 9 | 1 | 57012 10015 | Netzteil, vollst. (einschließlich LP15) | Power supply unit, compl. (including LP15) | Bloc d'alimentation secteur, compl. (inclusive LP15) | Unidad de alimentación, compl. (inclusive LP15) |
| 10 | 1 | 57012 53253 | LP15 | LP15 | LP15 | LP15 |
| 11 | 1 | 38150 40200 | Motor, vollst. | Motor, compl. | Moteur, compl. | Motor, compl. |
| 12 | 1 | 57012 06501 | LP1 | LP1 | LP1 | LP1 |
| 13 | 1 | 57012 11002 | Streifenlocher (ELO) | Tape punch | Perforateur de bande | Perforador de cintas |
| 14 | 1 | 57012 21002 | Druckwerk | Printing unit | Unité d'impression | Unidad de impresión |
| 15 | 1 | 57012 02001 | Papierführung | Paper guide | Guide du papier | Guía papel |
| 16 | 1 | 57012 03001 | Transportgetriebe | Feed gear | Engrenage d'avancement | Engranaje de avance |
| *17 | 1 | – | Kennungsgeber (ohne Kodierscheibe 32505 40086) | Answer-back unit (without coding disk) | Emetteur d'indicatif (sans disque de codage) | Emisor de características (sin disco de codificación) |
| *18 | 1 | – | LP 39 | LP 39 | LP 39 | LP 39 |
| *19 | 1 | – | LP 40 | LP 40 | LP 40 | LP 40 |
| *20 | 1 | – | Lochstreifenleser (LS) | Tape reader | Lecteur de bande | Lector de cintas perforadas |
| *21 | 1 | – | Tastatur | Keyboard | Clavier | Teclado |
| *22 | 1 | – | LP 38 | LP 38 | LP 38 | LP 38 |
| *23 | 1 | – | LP 37 | LP 37 | LP 37 | LP 37 |

* Die mit einem Stern gekennzeichneten Positionen entfallen bei dieser Fernschreiber-Ausführung

The items marked with an asterisk are omitted in this teleprinter version

L'astérique associé à certains numéros de piece indique que cette pièce n'existe pas dans la version spéciale considérée du téléimprimeur

Las partidas marcados con un asterisco están suprimidos en esto modelo del teleimpresor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